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NEW YORK, SATURDAY, NOVEMBER 15, 1919

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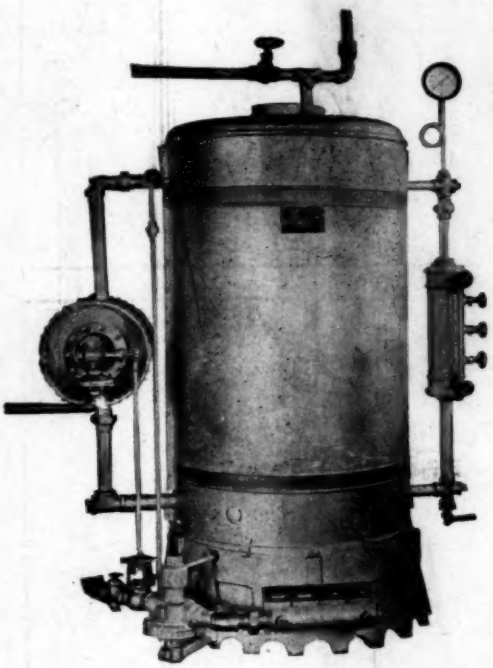

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The Gas Machinery Co.

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Graphic Representation Reduces Travel in Meter Repair Shop Hundreds of Miles with Consequent Saving in Costs

Rearranging the Meter Repair Shop — Subjecting the Diaphragm to a More Careful Investigation than a Mere Casual Optical Estimate

By H. M. RILEY

Consolidated Gas Electric Light and Power Company of Baltimore, Baltimore, Md.

The role that drawing has played in furthering engineering progress is truly a remarkable one, and it is difficult to, in any way, conceive the extent that this line of human endeavor would be reduced to were its graphic or pictorial aspect dispensed with. The expression of mechanical and technical ideas through the medium of drawings is developing by leaps and bounds, and even in branches other than engineering this mode of clarifying written and spoken thought is coming rapidly into vogue. For example, in the study of psychology, helpful recourse is made to diagrams and more or less mechanical models; the medical profession borrows one of engineering's most useful tools when it plots the curve of its patient's temperature. And so numerous other parallels could be drawn showing the advantage of graphic explanation over written, tabulated or even "pulmonary" efforts along this line.

It is a well-known fact that the efficiency engineer is of necessity a veritable crank on the use of curves, charts, diagrams and what not in studying out and finally reporting on the particular problem to be solved. In this connection, several years ago the writer made a study of the local company's meter repair shop with the idea of effecting a saving in meter travel, if such were feasible, particularly from a standpoint of economy. The idea of investigating this matter was prompted by the fact that considerably more room was acquired by this department due to certain changes and alterations in the building housing the shop. Briefly, then, since certain changes had of necessity to be made in the location of the benches and other meter shop paraphernalia, it was thought appropriate to endeavor to back up any changes that might be thought to be radical and out of the ordinary with convincing mathematical and graphic argument.

To digress for the moment, it is unfortunate that in so many cases, shops are changed as regards location of machinery, etc., purely on the basis of some erroneous qualitative ideas rather than a logical and conclusive mathematical argument.

Diagram Study of Meter Classification and Travel

In handling this case, the writer first made a study of the various operations to which each class of meters was subject and also at the same time endeavored to visualize to a certain extent, the different classes of meters and the reasons for their being so classified. By pursuing this line of procedure, there was at once established in one's mind a solid foundation for following out the problem in an intelligent and consequential manner. As a handy help in this direction, a graphic representation of the various operations on the different kinds of meters was drawn up (see Fig. 1). An explanation of this chart will probably be of some assistance to the reader. However, before doing this it might be well to state that this chart has proven exceedingly useful from time to time to the department heads when discussing certain features and problems relating to the work of the meter repair shop.

We will take the case of a "length of service" meter. After being received into the shop, the meter is placed on the small light test rack where gas is passed through the same at the rate of ¼ cu. ft. per hour. This is carried out for one revolution of the tangent. The meter is then taken to the prover and after its test is ascertained, its top, sides and back plates are removed, and later the diaphragms are stripped. Next, the meter is sent to the boiling out tank where the paint, dirt, etc., are removed. Then the tinning operation is carried out and the meter proceeds to the gassing machine and the channels are tested. New diaphragms are then put

in and the meter is again gassed for tightness. Thence it passes to the bench where the backs and fronts are put on and the fitting up is carried out.

The water test for leaks is next in order (any leaks being attended to) and the meter passes to the slow motion bench, thence to the prover. Next, the meter is topped and the tops gassed. Oil is then introduced and the final proof is given. If the proof is less than 99 or more than 101 the tops are removed and the proof gotten within the prescribed limits, whereupon the tops are again put on and the meter again proved.

The operation is concluded upon the meter going to the public service commission tester, to the painter, to the stockroom and lastly on to the district.

It is felt that this diagram is sufficiently self explanatory to require no further discussion. The reader must bear in mind that this chart is merely offered as a suggestion for graphically depicting meter travel, and is not put forth as an argument for illustrating the exactly correct sequence of operations on the particular classes of meters to be repaired.

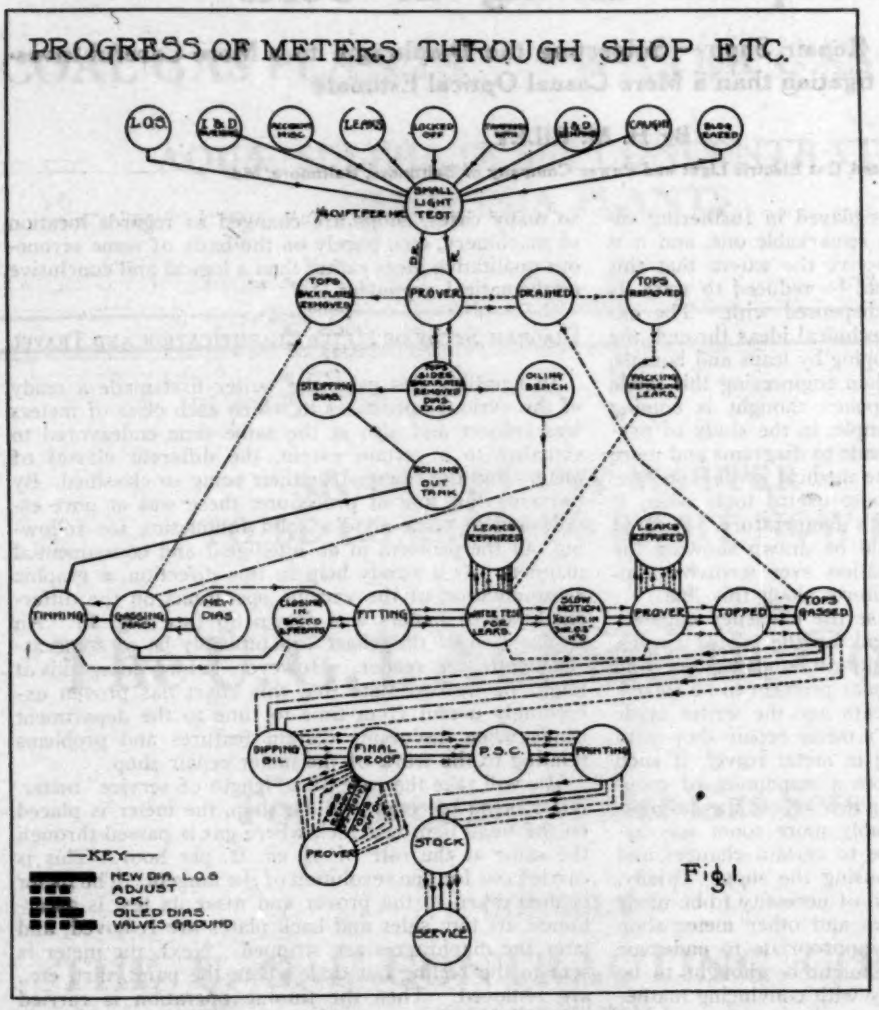


Fig 1.

A GRAPHIC REPRESENTATION OF THE VARIOUS OPERATIONS ON DIFFERENT KINDS OF METERS—A CHART SUGGESTION FOR GRAPHICALLY DEPICTING METER TRAVEL

Collecting Data and Materials for Solving the Shop Change Over Problem

After having given this chart some study, the writer next had a drawing made of the meter repair shop on the scale of 16 ft. to the inch. This plan drawing which was purposely made large so as to reduce any errors of scaling to a minimum only included the outline of the walls, partitions columns, etc., that is to say, it only included those features which were of a permanent nature and which could only be changed at considerable expense, etc. The items not included in this sketch were benches, large tools, machinery, location of provers, toilets, storeroom and the like.

With this drawing in hand, the next step consisted in cutting out of fairly heavy cardboard plan models of the different benches, machine tools, etc. These models were made to the proper scale and with the aid of thumb tacks permitted of easy moving about and attachment to the large drawing of the meter shop which had been mounted on a conveniently sized drawing board.

Looking up the meter records for the five previous years, and obtaining an average percentage of each class of meters sent through the repair shop constituted the next move. Thus we would have:

New diaphragm meters, a per cent.

Adjust meters, b per cent.

Valves ground meters, c per cent.

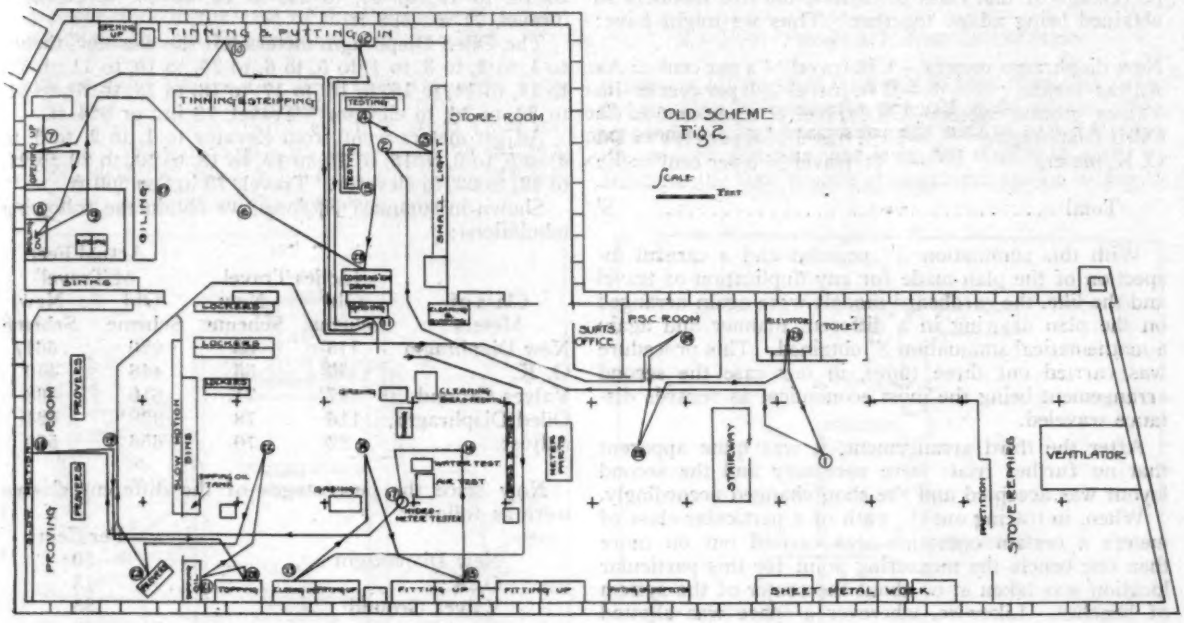
Oiled diaphragm meters, d per cent.

O. K. meters, e per cent.

The matter of accurately determining these percentages is a very important one, and in looking up the previous years' meter records due allowance should be made for any unusual happening affecting the shop routine, particularly when of a transient nature.

Also any proposed future change in the meter shop practice should be provided for since any shop change over should hold good for five years at the lowest estimate.

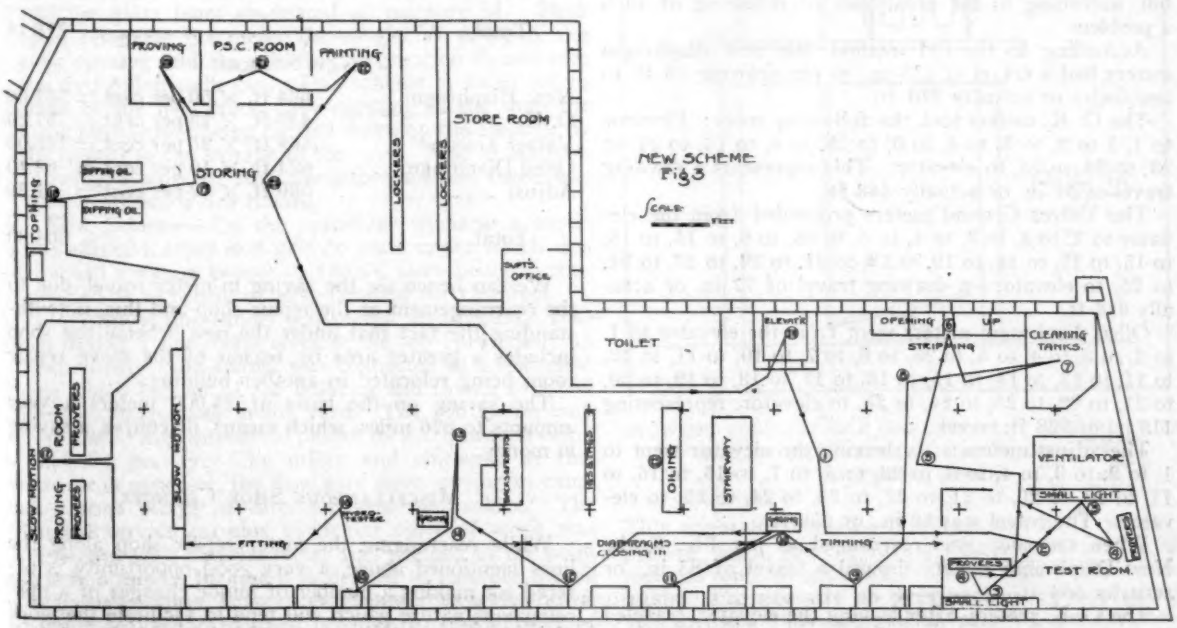
After having at hand all the data and materials necessary for solving the problem, the next move was to bring the meter shop superintendent into consultation, outlining the nature of the question to be worked out, and at the same time soliciting any of his ideas that might be



DRAWING OF THE METER REPAIR SHOP PREPARED FOR USE IN CHANGING THE LAYOUT OF THE SHOP

of value. In this way, good team work was secured and changes for errors reduced to a negligible quantity. The first trial layout on the large plan drawing was governed largely by good judgment and common sense, there being no set formula or mathematical routine to go by, otherwise the problem would have been quite simple and requiring only one shifting about of the cardboard models.

After all the models had been placed, the path of each of the five classes of meters was carefully measured by means of a steel scale—to one-sixteenth of an inch. Each of these distances was then reduced to



DRAWING OF THE METER REPAIR SHOP SHOWING THE NEW LAYOUT AFTER REARRANGEMENT WHICH SAVED UPWARDS OF 200 FT. IN RETRACEMENT OF METER TRAVEL IN THE SHOP

actual feet of travel and multiplied by the particular percentage of that class of meters, the five numbers so obtained being added together. Thus we might have:

New diaphragm meters	—A ft. travel × a per cent	= Aa
Adjust meters	—B ft. travel × b per cent	= Bb
Valves ground meters	—C ft. travel × c per cent	= Cc
Oiled Diaphragms	—D ft. travel × d per cent	= Dd
O. K. meters	—E ft. travel × e per cent	= Ee
Total		S^1

With this summation S^1 recorded and a careful inspection of the plan made for any duplication of travel and the like, the cardboard models were again arranged on the plan drawing in a different manner and again a mathematical summation S^2 obtained. This procedure was carried out three times, in our case the second arrangement being the most economical as regards distance traveled.

After the third arrangement, it was quite apparent that no further trials were necessary and the second layout was accepted and the shop changed accordingly.

When, in tracing out the path of a particular class of meters a certain operation was carried out on more than one bench, the measuring point for this particular location was taken at or about the center of the system of benches. Likewise, wherever a space was allotted for stacking the meters, measurement was taken to the center of this area. In this way, confusion was avoided without sacrificing accuracy.

Now let us examine the two drawings which will probably better explain the subject in question, and for the sake of clarity we have traced out the path of only one class of meters, namely, new diaphragm.

It is evident that the old scheme fairly groaned with retracements, and let it be said at this stage that this method had been more or less carefully thought out—but, according to the usual way of disposing of such a problem.

According to the old method, the new diaphragm meters had a travel of 115 in., as per drawing (8 ft. to one inch) or actually 920 ft.

The O. K. meters took the following route: Elevator to 1, 1 to 2, to 3, to 4, to 5, to 28, to 6, to 16, to 21, to 23, to 24, to 25, to elevator. This represents a drawing travel of 56 in. or actually 448 ft.

The Valves Ground meters proceeded from the elevator to 1, to 2, to 3, to 4, to 5, to 28, to 6, to 15, to 16, to 15, to 17, to 18, to 19, to 20, to 21, to 22, to 23, to 24, to 25, to elevator—a drawing travel of 77 in. or actually 616 ft.

Oiled diaphragm meters went from the elevator to 1, to 2, to 3, to 4, to 5, to 28, to 6, to 7, to 10, to 11, to 12, to 11, to 13, to 14, to 15, to 16, to 17, to 18, to 19, to 20, to 21, to 22, to 23, to 24, to 25, to elevator, representing 116 in. or 928 ft. travel.

The adjust meters after leaving the elevator went to 1, to 2, to 3, to 4, to 5, to 28, to 6, to 7, to 15, to 16, to 17, to 19, to 20, to 21, to 22, to 23, to 24, to 25, to elevator. The travel was 82 in., or 656 ft.

When the shop was rearranged as per Fig. 3, the New Diaphragm meters showed a travel of 83 in., or actually 664 ft.

The O. K. meters, after leaving the elevator, traveled to 1, to 2, to 3, to 4, to 18, to 19, to 20, to 21, to 22, to 23, and thence to the elevator. Travel, 55 in., or 440 ft.

The Valves Ground meters went from the elevator to 1, to 2, to 3, to 4, to 5, to 6, to 10, to 15, to 16, to 17, to 18, to 19, to 20, to 21, to 22, to 23, to elevator. Travel, 71 in., 568 ft.

The Oiled Diaphragm meters left the elevator, thence to 1, to 2, to 3, to 4, to 5, to 6, to 25, to 10, to 11, to 12, to 13, to 14, to 15, to 16, to 17, to 18, to 19, to 20, to 21, to 22, to 23, to elevator. Travel, 78 in., or 624 ft.

Adjust meters went from elevator to 1, to 2, to 3, to 4, to 5, to 6, to 15, to 16, to 17, to 18, to 19, to 20, to 21, to 22, to 23, to elevator. Travel, 70 in., or 560 ft.

Shown in summarized form, we obtain the following tabulations:

Class of Meters	Inches Travel Old Scheme	Inches Travel New Scheme	Actual Feet of Travel Old Scheme	Actual Feet of Travel New Scheme
New Diaphragm	115	83	920	664
O. K.	56	55	448	440
Valves Ground	77	71	616	568
Oiled Diaphragm	116	78	928	624
Adjust	82	70	656	560

Now since the percentages of the different classes were as follows:

	Per Cent
New Diaphragm	50
O. K.	13
Valves Ground	25
Oiled Diaphragm	10
Adjust	2

We might calculate as follows:

OLD SCHEME

New Diaphragm	920 ft. × 50 per cent	= 460.00
O. K.	448 ft. × 13 per cent	= 58.24
Valves Ground	616 ft. × 25 per cent	= 154.00
Oiled Diaphragm	928 ft. × 10 per cent	= 92.80
Adjust	656 ft. × 2 per cent	= 13.12
Total		778.16

NEW SCHEME

New Diaphragm	664 ft. × 50 per cent	= 332.00
O. K.	440 ft. × 13 per cent	= 57.20
Valves Ground	568 ft. × 25 per cent	= 142.00
Oiled Diaphragm	624 ft. × 10 per cent	= 62.40
Adjust	560 ft. × 2 per cent	= 11.20
Total		604.80

We can hence see the saving in meter travel, due to the rearrangement of the repair shop and this, notwithstanding the fact that under the new scheme the shop includes a greater area by reason of the stove repair room being relocated in another building.

The saving on the basis of 25,000 meters a year amounts to 826 miles, which means, of course, a saving in money.

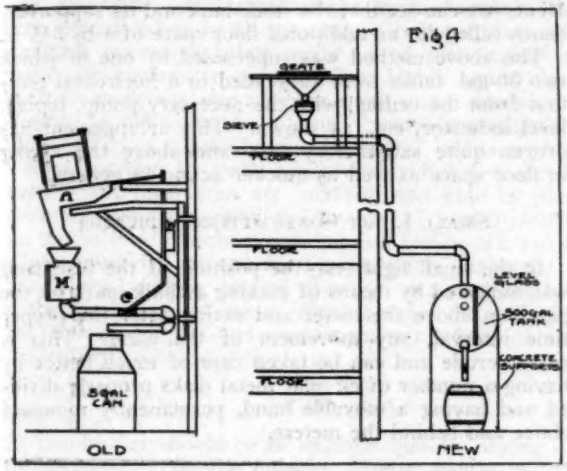
MISCELLANEOUS SHOP CHANGES

While rearranging the meter repair shop along the lines mentioned above, a very good opportunity is offered for making a number of minor changes of a miscellaneous nature which will tend to facilitate the work and effect appreciable economies. As a matter of fact, such changes will unconsciously suggest themselves as the work proceeds, so that in the end one can feel that

a rather exhaustive study has been made of the meter repair shop's scheme of operation. Among such changes and suggestions in the case of the Baltimore Company, the following might be mentioned and described.

1.—Handling Waste Oil and Condensation from Meters

Fig. 4 depicts the old and new schemes of handling the oil and condensation from the old meters and briefly described, consisted of the following routine:



SHOWING BOTH THE OLD AND NEW PLANS OF HANDLING OIL AND CONDENSATION FROM OLD METERS

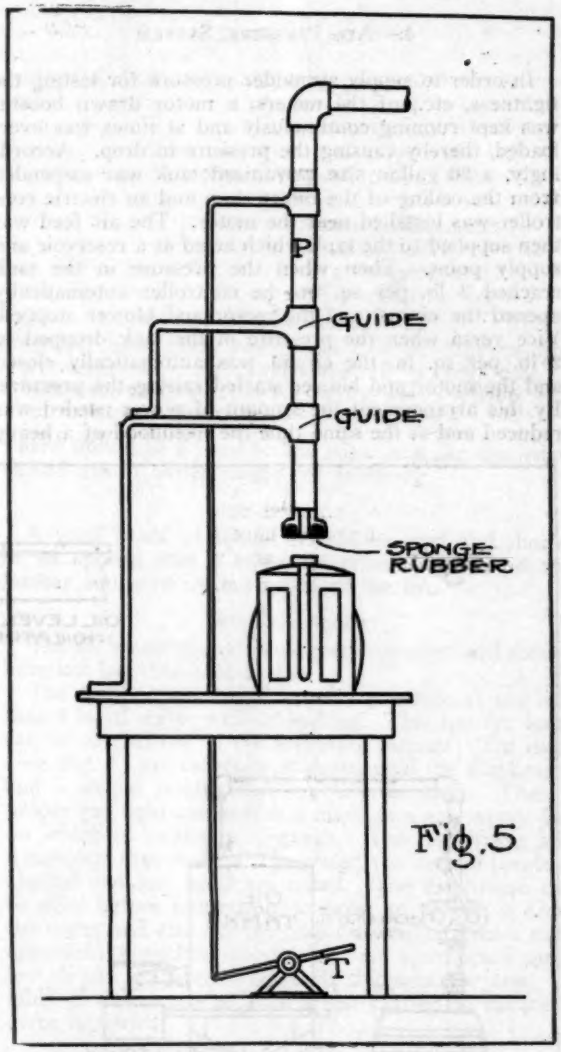
Old Scheme.—The meter to be drained was placed upon drain pan A, and due to its greater weight, the weight W was lifted, causing the connected lever to close cock C. The oil and condensation in turn emptied into the glass front graduated oil measure M. Then upon removing the meter the weight W dropped, the cock opening and the oil and condensation flowed into the five gallon milk can. This scheme at times led to some of the five gallon cans standing in the shop for some time before being carried down on the elevator by the janitor to the storage in the yard. Also in addition to being a more or less messy proposition, there was always present a fire hazard.

New Scheme.—On the particular workman's bench was affixed a strap iron grid or grate under which was attached a square hopper or funnel, same being so constructed as to permit of easy removal for cleaning.

Just below this funnel was placed an additional funnel having a fine metal sieve at the top (preferably an iron sieve). The funnel was connected to a 2-in. pipe line which led out of the building and thence to a 500 gallon storage tank in the yard. The 500 gallon tank was placed high enough to permit of a drip wagon being filled by gravity. The utility and efficiency of this scheme is apparent, the iron wire sieve serving to catch any large pieces of dirt, sediment and solder. The janitor service for this particular piece of work was dispensed with and the meter was drained at the point where opened. In case it is desired to measure the oil and condensation, it is an easy matter to scale the oil level from day to day and pro rate for the number of meters opened, allowing, of course, for any of the liquid taken from the storage tank. It might be mentioned that no trouble has been experienced from the drain line freezing up in winter.

2.—Foot Treadle Meter Connection

We are all familiar with the flexible hose and swing nut coupling for connecting a meter to the prover. This, of course, is a good and durable method of performing the desired function, but it is felt that it is quite inferior to the foot treadle arrangement shown in Fig. 5.



SHOWING FOOT TREADLE ARRANGEMENT WHICH IS INSTALLED EXTENSIVELY THROUGHOUT THE BALTIMORE SHOP

This apparatus consists of a foot treadle T which is pressed down, thereby lifting pipe P after which the meter is centered against a two-sided right angle wooden guide. The pressure on the treadle is released slowly and the pipe P lowers and its end engages the meter inlet. In the end of pipe P is a mandrel surrounded by a ring of sponge rubber which ensures a gas tight

connection. The value of this device is at once apparent and it is installed extensively throughout the shop.

3.—Atmospheric Soldering Iron Furnace

There are several good makes of soldering iron furnaces on the market which are entirely satisfactory for heating up the soldering irons, working on the principle of the ordinary bunsen burner. By installing this style of furnace, one is able to dispense with the old fashioned air blast proposition which certainly has quite a few disadvantages.

4.—Air Pressure System

In order to supply air under pressure for testing the tightness, etc., of the meters, a motor drawn booster was kept running continuously and at times was overloaded, thereby causing the pressure to drop. Accordingly, a 20 gallon size galvanized tank was suspended from the ceiling of the meter shop and an electric controller was installed near the motor. The air feed was then supplied to the tank which acted as a reservoir and supply point. Then when the pressure in the tank reached 3 lb. per sq. in. the controller automatically opened the circuit and the motor and blower stopped. Vice versa when the pressure in the tank dropped to 2 lb. per sq. in. the circuit was automatically closed and the motor and blower started raising the pressure. By this arrangement the amount of power needed was reduced and at the same time the likelihood of a heavy demand exceeding the capacity of the blower was almost entirely eliminated.

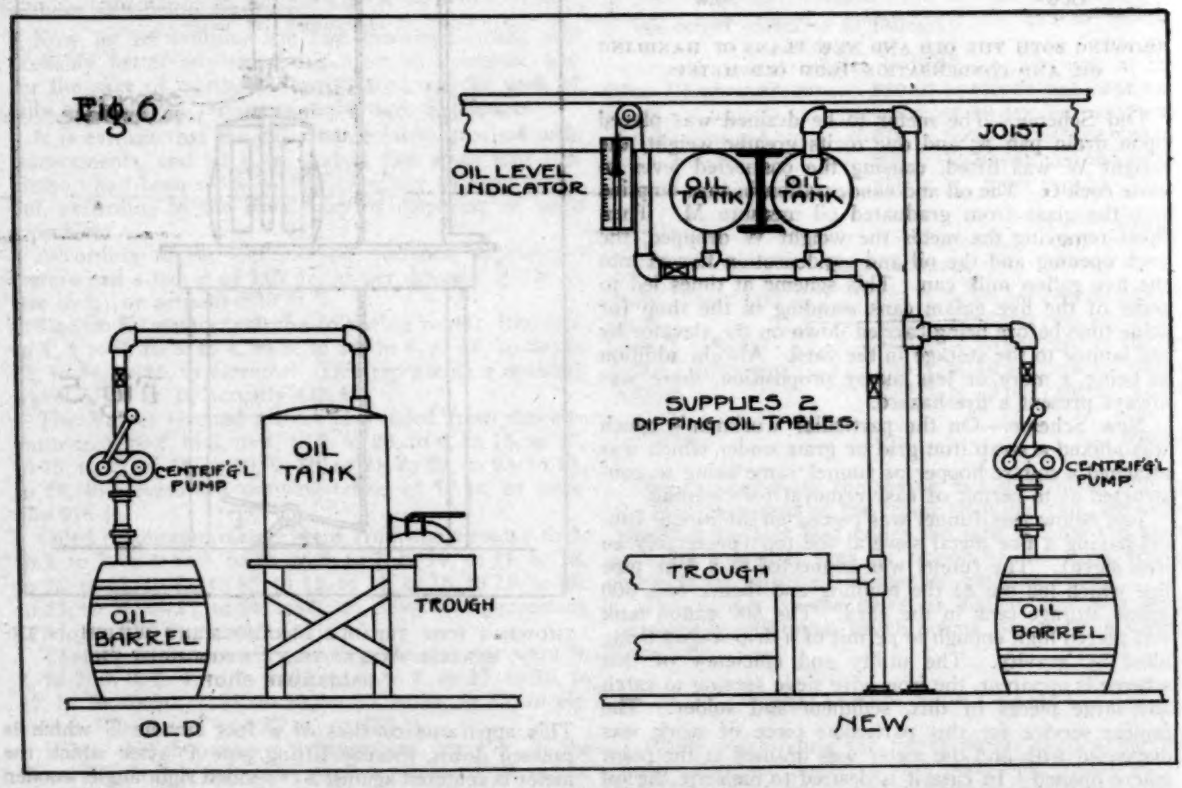
5.—Handling Neutral Oil

The old scheme (see Fig. 6) provided for a 60 gallon copper tank which was mounted on a bench 4 ft. long by 3 ft. 6 in. wide by 3 ft. high, from which elevation it could drain into other rectangular tanks attached to the oil benches proper. From these rectangular tanks or troughs, the oil could be dipped out and a definite quantity placed into the funnels feeding the meters. Hence we can see that the stock tank and its supporting bench called for an additional floor space of 4 by 3½ ft.

The above method was superseded by one in which two 30-gal. tanks were suspended in a horizontal position from the ceiling, with the necessary pump, piping, level indicator, etc., as shown. This arrangement has proven quite satisfactory over and above the saving in floor space as well as quicker action in general.

Small Light Consumption Indicator

In the small light test, the position of the test hand was indicated by means of making a chalk mark on the partition above the meter and noting after the proper time interval, any movement of the hand. This is rather crude and can be taken care of much better by having a number of circular metal disks properly divided and having a movable hand, permanently mounted above and behind the meters.



DRAWING SHOWS ON THE LEFT THE OLD SCHEME PROVIDING FOR A 60-GALLON TANK MOUNTED ON A BENCH 3 FT. HIGH. ON THE RIGHT THE NEW SCHEME WITH TWO 30-GALLON TANKS SUSPENDED FROM CEILING IS SHOWN. THIS ARRANGEMENT NOT ONLY SAVES FLOOR SPACE BUT AFFORDS QUICKER ACTION IN GENERAL

Meter Diaphragms

During this investigation of the meter repair shop, the matter of diaphragms was considered at some length, particularly with the thought in mind of getting up a set of specifications as well as the standardized diaphragm testing routine which would govern the purchase of this article.

Although not much progress has been made along this line, due to the exigiencies of the leather market, the war, etc., familiar to all gas men, it is hoped that the thoughts expressed below might be of some value to metal repair shops in general. It is highly logical that such an easily variable affair as a gas meter diaphragm should be subjected to a more careful investigation than merely a casual "optical estimate" of its worth. Taken for and by there are probably but few meter repair shop men who are qualified and able to pass accurate judgment upon the quality of leather solely on the basis of closely examining and feeling the same. There must be, nevertheless, some fairly simple tests which can be easily applied to arrive at a close mathematical estimate of meter diaphragms. Accordingly, the following ideas and suggestions are submitted for the reader's consideration:

Leather

The leather should be of uniform quality, having no scores or cuts on the outside. There should not be any hard or rough spots on the same. The uniformity of thickness of the leather can be closely determined by means of a ratchet stop micrometer, caliper readings being taken along the center of the diaphragm at intervals of two inches. Below is given a set of figures of a test for thickness.

Maximum thickness	0.0344 in.
Minimum thickness	0.0225 in.
Average thickness	0.0264 in.
Number of samples measured.....	13

The flexibility can also be looked into and a simple test can be devised for this investigation.

It is not believed that the tensile strength of the leather is of sufficient importance to warrant its determination.

The stretch of the leather when mounted on the rings should be 2½ in. from cord to cord.

The total amount of oil absorbed in a certain time and the rate of absorption might be worth investigating. Such a test can be carried out by suspending weighed strips of leather with the short edge just penetrating the surface of the oil and allowing them to soak up the oil. Then at certain intervals, the height of oil travel can be measured and at the conclusion the strip can be weighed and the amount of oil absorbed determined.

Thread and Stitching

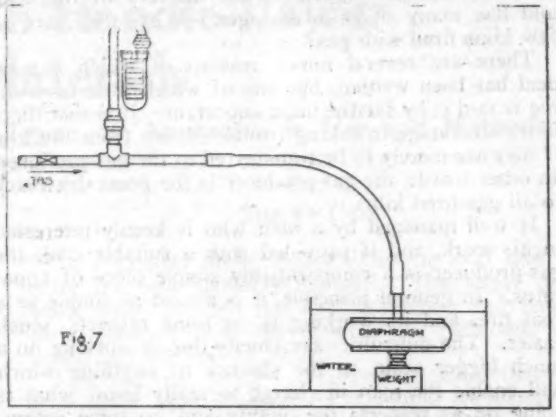
The thread used in sewing the leather should be three ply and preferably of silk. None of the stitches should puncture through or fail to catch the leather. In this case the tensile strength of the thread might be profitably taken into consideration.

The minimum number of stitches allowable per inch of seam should be 14.

There should be at least four wraps of cord used in binding the leather to the ring. Its tensile strength is not considered of prime importance.

Rings.

The diaphragm rings should be made of heavy tin, not less than 27 gauge U. S. standard. They should be circular and as near 8 11/16 in. in diameter as practicable. There should be no sharp edges on the same.



SHOWING HOW TESTS FOR LEAKS CAN BE CARRIED OUT BY EMERSING THE DIAPHRAGM IN WATER, CONNECTED TO THE GAS SUPPLY LINE, AFTER WHICH THE DESIRED PRESSURE IS APPLIED

There should be a bead on the edges and the disc edge should afford ample flange for soldering.

Shellac

A good grade of shellac should be used and should be so applied that a minimum amount gets onto the leather and none on the inside of the tin.

Miscellaneous

The tin seams should be properly sweated and should have not less than a ¾-in. lap.

The diaphragms should stand a pressure of not less than 8 in. of water without leaking. This test for leaks can be carried out in the following manner: Tin discs (see Fig. 7) are carefully soldered onto the diaphragm and a weight is affixed to one of the discs. Then a proper gas tight connection is made to a gas supply line on which is located a U-gauge. The diaphragm and weight are then immersed in water, the desired pressure applied and any leaks are noted. The diaphragm can be oiled before immersion, in order to protect it from the water and also for the reason that this gives a state approaching working conditions. An appropriate number should be taken from each shipment for test. A table of the results of such a test carried to failure is given herewith:

No.	Pressure Read to Make Dia. Leak. Inches Water.	Location of Leak.
1.....	15.00	Leather seam
2.....	15.00	Leather seam
3.....	17.7	Leather seam
4.....	35.4	Leather seam
5.....	19.0	Leather seam
6.....	24.5	Leather seam
7.....	51.7	Leather seam
8.....	28.6	Leather seam
9.....	.....	Tin
10.....	.....	Shellac on wrapping
11.....	27.2	Leather seam
12.....	27.2	Leather seam

Gas Producers for Kilns

There is no doubt that for ease of regulation and for cleanliness of fire, a gas-fired kiln is superior to any other. In burning refractory materials of the highest quality, the use enables higher temperatures to be reached; it saves trouble in the delivery of the coal, and has many other advantages. Why, then, are so few kilns fired with gas?

There are several minor reasons of which a good deal has been written, but one of which little or nothing is said is by far the most important. It is that there is no advantage in taking troubles away from the kiln if they are merely to be transferred to the gas-producer. In other words, the gas-producer is the great drawback to all gas-fired kilns.

If well managed by a man who is keenly interested in his work, and if provided with a suitable coal, the gas-producer is a comparatively simple piece of apparatus. In general principle, it is almost as simple as a coal fire, and its working is, in some respects, much easier. The difficulties are chiefly due to working on a much bigger scale, to the absence of anything which will enable the man in charge to really know what is going on as respects the quality and, to some extent, the quantity, of the gas produced, and the various adjustments which should be made in accordance with these.

In short, the average gas-producer is an appliance which is put forward as a substitute for some of the skill of the kiln burner, whereas in reality it requires an additional amount of skill of an entirely different character to obtain steady and consistent results. This is well known in the metallurgical works, where gas producers are employed in large numbers, and where a man has to be in charge of the men who work the producers. Instead of being the simple appliance which it is commonly understood to be, a gas-producer is capable of the most rapid variations in the quality and quantity of the gas produced, and if supplied with an unsuitable coal, it is sure to lead to trouble.

Quite some attention has been given to this subject, and the conclusion that has been reached is that these difficulties and objections are almost wholly due to demanding too much from the producer. Experience has proved that a producer which is supplied with a suitable coal, in pieces of satisfactory size, which are fed into the producer at just the right times, and in just the quantities needed, while the whole mass inside the producer is kept uniform in texture, with sufficient porosity for the gas to be made uniformly, and the ashes removed at suitable times—all these conditions being simultaneous—will give excellent results. If any one of these conditions is not fulfilled there is sure to be trouble.

PUBLICATIONS

American Gas Works Practice

Author George Wehrle; clothbound; 741 pages; illustrated. Published by Progressive Age Publishing Company, 52 Vanderbilt Avenue, New York City. Price, $4.

This is a worth-while contribution to gas literature by an author well qualified to handle the subject he has undertaken. The liberality in use of illustrations and the tone of the text make it a book that can be as readily comprehended by the novice as by the experienced gas engineer.

The author's tendency to editorial comment in this work are unfortunate in a text book of this nature, particularly so since his deductions and the opinions he expresses with a dogmatism that may preclude independent reasoning on the part of the novice are very much open to question if not actually in error.

For instance, on page 514 he states cast-iron mains will never be used to the extent they have in the past, and on page 515 "our recommendation would be that where soil and other conditions are favorable to the life of wrought iron pipe, that it be *exclusively* used with welded joints."

These words will be read with grim humor by the engineer who has in this period of high costs to take up a line which has outlived its usefulness because of lack of permanence of the material of which it is built.

The lessons of these next few years—and their cost—may have the effect of establishing cast-iron on a more enviable basis in the gas field than it has ever occupied before.

He is very much open to question when he avers that a tightness of joint sufficient for high pressure service is difficult if not impossible to maintain with cast-iron pipe.

He is alone in his assumption to ability to lay down the relative values of the cast lead and lead wool joints.

Waterworks conventions and gas conventions have tossed this question back and forth unceasingly, yet none have felt competent to lay down any such final dictum as this author supplies.

But nothing is perfect. Such imperfections as herein revealed simply serve to make the undisputed excellence of the greater part stand out to best advantage.

Tests of Flexible Gas Tubing

Booklet; paper binding; 7x10 in.; 37 pages. Issued by the Department of Commerce, S. W. Stratton, Director.

This booklet is No. 133 of the Technologic Papers of the Bureau of Standards. It has been prepared by R. S. McBride, Engineer Chemist, and Walter M. Berry, Associate Gas Engineer of the U. S. Bureau of Standards. The boklet tells of the purpose of the investigation; the scope of the tests, and a comprehensive description of the experimental results. It contains many summary test charts and photographic illustrations. It also contains an appendix with a report on gas tubing inspection in Newark, N. J., by Ellsworth Francisco, Inspector of Gas and Gas Meters, Newark, N. J.

Why and How Coke Should Be Used for Domestic Purposes

Booklet; paper binding; 9x6 in.; 20 pages. Issued by the Department of the Interior. This is Technical Paper No. 242 of the Bureau of Mines.

This report, prepared by Henry Kreisinger and A. C. Fieldner, contains much interesting data, such as the advantages of coke as house heating fuel; the cost of smoke to the community; how it promotes efficiency in metallurgical industries, etc. It also contains rules to be observed in burning coke and detailed instructions how to burn coke in house-heating equipment.

At Zinc Works, Aim Is to Tend Towards Less Desirable Coals and Build Up a Producer Practice that Can Handle Lower Cost Materials

G. S. Brooks and C. C. Nitchie Describe Types of Apparatus in Use and Methods of Operation

With the gradual depletion of the natural gas pools of the Kansas district, together with the uncertainty of further cheap fuel developments, some of the Western zinc companies turned to the coal fields, attracted by their permanency and the success of the Matthiessen & Hegeler Company and the Illinois Zinc Company. Being then confronted with the problem of using a relatively high-priced fuel, although the ultimate supply was very great, the fuel economies of the kilns and furnaces became of far more importance, and the more modern equipments, as a result, embodied distinct gains in this phase of the business. In addition, there have been some pronounced advances in the actual making of gas from these coals.

Increased efficiency in gas making has contributed its share to lowering costs and those plants located in the higher priced fuel districts have probably been obliged to study these economies somewhat more closely. Naturally, many beneficial changes have resulted in both practice and apparatus in these sections. On certain Western coals, for instance, the actual saving in fuel consumption has been 50 per cent. By this is meant that, where about 1.75 tons were burned to smelt 1 ton of oxidized ore, 0.7 to 0.9 tons is now required, declared G. S. Brooks, E.M., and C. C. Nitchie, A.B., Depue, Ill., in a paper presented at Chicago meeting of American Institute of Mining and Metallurgical Engineers. While comparisons by W. R. Ingalls of fuel economies in smelting in this country and Germany before the war may, in general, be correct, they do not appear to do justice to the more progressive American practice. It is doubtful whether German plants were substantially bettering these fuel ratios. Data furnished by Bender and Frams do not afford records averaging less than 0.9 ton coal per ton ore on materials from 40 to 50 per cent zinc.

Fuels

As producer fuel, Illinois, Indiana and Kansas coals offer a wide range of material, although varying much in their amenability to gasification. The proper fuel for each plant can only be determined after comparative testing, the results of which include not only the weight and price of coal consumed per unit of production, but also the cost of gasification, including such items as labor, steam, etc. Naturally, the first cost of the coal at the plant is a great deal a matter of location, because for standard sizes the mine prices do not vary materially. In zinc works, where muffle roasting kilns and retort furnaces are the chief consumers of gas, clean gas is not considered important, so that the finer sizes of coal, dusty though they are, can be used.

Size of Coal

As a general thing, coarse mine-run coal does not make the best producer material. The larger pieces work down through the distillation bed and tend to make unequal blow distributions on both the hand poked and mechanical types.

Egg and nut, being nearly free of fines, make the most easily handled material. They are frequently low in ash and the uniformity of their interstitial channels makes even blowing an easy matter. In the hand-poked producer, these sizes make easier work in "bed loosening" and "side slicing."

With the lower priced screenings, even with their more troublesome clinker and poor blowing properties, the best gains have been made in modern zinc practice. Washing makes some of the poorer grades of slack very satisfactory producer material.

Particularly with slack coal, not only should the total ash be carefully examined, but also its fusibility; in fact, this latter quality is often the one factor that will exclude a coal as a producer fuel. There is not a great deal of accurate data on the melting point or composition of Western coal ash. For instance, the ash from a northern Illinois slack ran as follows: SiO_2, 40.8 per cent; Fe_2O_3, 20.7 per cent; Al_2O_3, 20.6 per cent; CaO, 6.5 per cent; MgO, 0.9 per cent; undetermined, 10.5 per cent.

This ash was made from raw screenings containing H_2O, 14.5 per cent; volatile matter, 26.8 per cent; fixed carbon, 42.0 per cent; ash, 16.7 per cent; sulphur, 3.7 per cent.

As an example of poor material, there are found in Saline County, Ill., coals giving an ash with as high a lime content as 26 per cent; these naturally make a very easily softened ash, so much so in fact that there has been trouble in keeping locomotive grates clean. This coal would be out of the question for gas making. A typical mine run, thick vein coal gave an ash of: SiO_2, 34.4 per cent; Fe_2O_3, 30.8 per cent; Al_2O_3, 29.4 per cent; CaO, 4.3 per cent; MgO, 0.6 per cent; undetermined, 0.5 per cent.

This original coal ran 24.4 per cent ash and 7.1 per cent sulphur in the coal yet it did not form as hard a clinker as the first slack ash given. Of course the difficulties of clinkering are chiefly controlled by the following: (1) Rate of combustion, and therefore actual combustion zone temperatures; (2) size of coal, i. e., contract factor; (3) steam for disintegration; (4) agitation of material in combustion zone effected by hand poking or mechanical means; (5) removal of ash from combustion zone to ash zone promptly and completely.

As a producer fuel, Illinois coals have the well-known

advantage of all bituminous coals, an abundance of hydrocarbons. For high-temperature work, this is important in the subsequent efficient transfer of heat from the flames to furnace walls or retorts. It gives to the burning gas what Siemens called its "light and heat radiating capacity," and depends on the presence of free carbon particles, the result of hydrocarbon dissociation. These very small particles are heated to the flame temperature and, remaining incandescent, radiate heat and light in all directions.

Types of Producers and Their Operations

Hand-poked, Dry Bottoms.—Of this type, the earliest was the Matthiessen & Hegeler generator; its modifications have now come into somewhat extended use at La Salle, Springfield, Danville, Argentine, Hillsboro and Burgettstown. Essentially, the producer comprises a stationary brick shaft with feed openings in the top for coal and a gradually narrowing throat, or bosh, at the bottom, below which is the ashpit. At the point of minimum opening at the throat there is usually a water-cooled frame; this prevents the destruction of the lining of this opening and breaks the clinkers. The blow box is incorporated in the ash bottom, which is wide enough to allow the ash to seal the column, running out to the angle of repose but not quite reaching the box side. Along these sides, the air circulates and distributes itself through the bed. A fan delivers the air by a main trunk line, using damper cut-offs for the adjustment of the individual producers. There are from one to four units to a spelter furnace generator equipment.

This type of producer is ordinarily used on spelter furnaces with waste heat boilers as heat recuperators, or, when on kilns, is usually operated in connection with air heaters. There is necessarily a large amount of clinkering with this type, as no steam is ordinarily introduced as a "mover" for the primary air. Fig. 1 shows the general arrangement of an installation formerly used at Depue. A positive blower used as an exhauster between the furnace and producers has been in successful operation at La Salle for a good many years. This, of course, does away with either a fan or a steam blower. The breaking down of these producers often becomes a very serious matter and requires considerable experience and skill unless the coal be uniform and its clinkering inconsiderable.

The Illinois Zinc Company Swindell producers are built in the same manner as the Hegeler down to the combustion zone. With these producers, grate bars of square iron section hold the fuel bed from the ashpit. When the morning work is done, a second set of grate bars is inserted through the walls through the top of the ash bed just below the combustion belt. When these are in place the lower set is pulled, letting the ash from 24 hour operation into the pit. When the cleaning is done, the lower set is replaced and the upper temporary bars pulled, allowing the contents of the producer to settle. This operation permits very little disturbance of the different fuel beds and is an effective system of cleaning fires. It has also great simplicity of both apparatus and operation. These producers are blown with jet blowers of the Schuette & Koerting type. In both, hand poking through the top is used to keep the beds open and burning uniformly.

Three blocks of twelve units are used on each spelter furnace, and two blocks of eight units for each M. & H. kiln. At times when the ash does not give large clinkers, the morning work is done by simply moving the permanent bars aside and working the material down into the pits with a bar. The sliding dump boxes are inclined to be smoky when a producer is under pressure and fill the house with gas at the dumping times.

Hand-Poked, Wet Bottoms

In this class are the well-known Duff producers. At Depue there are six of the Duffs on the spelter furnace gas equipment and fourteen in the roasting work. An 800-retort furnace of the Siemens regenerative type requires from three to four producers. The producers are of the usual design and are blown with Schuette & Koerting steam jet blowers. It has been found beneficial at Depue to increase the size of openings in the grates over that usually prescribed by the manufacturer. Especially in working up practice on the finer coals, this aids in the blow distribution. Against this, of course, is the more frequent cleaning required below the grates.

Under normal working, the rate of gasification varies from 8 to 10 lb. of coal per square foot of area per hour. It is well to note the fact that, on a spelter furnace, this average rate may be considerably lower than the actual rate required just before the charge is "touched off." These figures are not the limit of the capacity, but somewhere near the proper capacity for a minimum of labor coupled with a good quality of product.

The cycle of operation begins with the removal of ashes from the water-sealed scows at 5.30 a. m. This operation is done by the regular producer man, one to each producer. Care is required in removing the right amount of ash, so that the combustion zone does not drop too low in the next step. As a rough indication of how much ash to remove, a good producer man will run his hand up the steel shell and locate fairly closely the top of the ash bed and the bottom of the combustion zone. Should the clinker be very hard, water is introduced by pipes into the side of the shell; this practice, although somewhat questionable, does make a brittle clinker. Its action on the brick lining, as can be imagined, is not particularly good. The tendency is to take out a little less than the make of ash for, say, three or four days, then as the accumulation begins to be noticeable in the operation, to pull down very low on the fifth day.

Ordinarily the "making of the fire" is done at the same time the kiln or furnace is off gas, which occurs once at least in the shift. The steam being cut off, the producer man opens up all top poke holes preparatory to beginning work. It is advisable to have the fuel bed of green coal pretty well burned off at this time, so that the top is clear of gas. Beginning at one corner, a "first" slice hole is made through the bed, which has been left arched over the cavity made by taking out ash. This is directly above one of the openings between the wall and the cast-iron grate. Working out from this by undercutting the edge of the hole, the ash is gradually poked down upon the grate, allowing the fire bed to follow from above but not to mix. Both sides of the producer are worked in this fashion. The loss of carbon in the ash during this work depends on the care of the operator. Naturally some coke is bound to be

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As the Journal Views It

Higher Grade Managements in Small Territories

When an interest erects a gas plant in a small territory it seems to take it as a matter of course that the proper manager to obtain is a man who will come at a salary that the elevator man of a big company would disdain as meager.

This is because the financial interest behind the project has not sensed the full possibilities of its franchise.

The small company that is destined to follow the beaten groove must, of course, expect to be managed by a man who can be gotten cheap.

Lighting business is not so easily to be gotten in the new territory. Electricity usually has been there first. Investments have been made in electric lighting fixtures and the town's best families have not the inclination or wherewithal to change over to gas lighting.

Small town people are normally more dollar wise in expenditure than city folks. They might concede the convenience, even the luxury of the instantaneous water heater, but the prospective gas bill is likely to scare them out unless they are handled by a higher-grade type of manager than that which can generally be gotten for a little more than a hundred dollars a month.

They are not so apt to be impressed with the ashes, the objection to cooking with coal. Some of them actually look at their ashes as an asset. The siftings are excellent on the droppings boards of their chicken houses and in the dust boxes. Then there are always holes to be leveled up in the yard and slippery sidewalks to be ashed over.

They are not so apt to be panic-stricken at the uncertainties of coal supply. Wood is usually to be had

for the gathering and carrying. And wood ashes are esteemed good for the garden.

Generally speaking, the conventional domestic business requires a higher grade of talent to secure in the small territory than in the large. The old set monologue of advantages and disadvantages, learned by heart and mumbled off without vigor or enthusiasm do not carry as much weight in the small town as in the big city. Different angles of looking at things exist.

A high grade man should have no great difficulty in doubling the domestic business in a small territory where a medium grade man has held sway.

But even this does not exhaust the possibilities of the small company. Getting away from the time-worn groove it has, even in its small sphere, industrial business right at hand beside which the maximum domestic business would fade into insignificance.

All that is needed is men of vision. And such men cost something.

American industry has come to the point where it cannot afford cheap help.

All Very Good—But Who Pays the Bill?

A gas company's workers felt they needed more pay in order to live. The gas company already running behind financially didn't feel that it could look deeply into the rights or wrongs of the matter; it couldn't raise wages—to do so would mean extinction.

Then a bright idea. Someone to avert a strike suggested a conference. The willingness of both parties to enter into it, we understand, received warm commendation from the public press.

What self delusion!

How on earth can this conference expect to solve the problem?

If the workers are honest in their contention that the cost of a decent existence has outstripped their wages no amount of glib explanations, flattering, urgings to view the other side of the question will put the missing loaf of bread in the pantry.

The only result of the conference that will prevent them from striking later is a raise in wage.

If the gas company is honest in its contention that it is already on the road to bankruptcy, no findings of the conference will put the big figure on the right side of the ledger. And what profit to the workers if they get a raise in wages, and, later, the company going broke, they get no wages at all? What profit to the public, if by averting a strike, gas plant operations are not interrupted for a short time, if later, through a financial collapse, they are suspended indefinitely?

The AMERICAN GAS ENGINEERING JOURNAL does not depreciate the value of talking things over. But there are some problems that conferences cannot solve.

The solution to this particular problem is a readjustment in rates.

When the automobile manufacturer cannot make his car and a profit at an established price, he raises the price. Likewise the coal producer, the pipe maker, and so on.

Maybe the gas manufacturer could keep himself supplied with labor even with his present inflexibility as to selling price if he were isolated and distant from other industries that compete for labor.

But under present conditions he must meet the bid or do without. If he cannot get a price for his product that will enable him to do so, then the end of his operations are well within sight. If the public wants gas, its agents must look upon the gas company's problems with a more intelligent eye.

At Zinc Works, Aim Is to Tend Toward Less Desirable Coals and Build Up a Producer Practice that Can Handle Lower Cost Materials

(*Continued from page* 470.)

tumbled into the ash in this undercutting, but it need not be serious with close attention to the work.

Another possibility that must be guarded against is the mixing of "float" clinker with the coke bed. When this occurs, the floater, no longer having the advantage of a high carbon content, is gradually softened in the combustion zone and builds up with the fine material around it, resulting frequently in a very troublesome slab of clinker.

When the fuel bed has been leveled off, the steam blow is turned on once more and a thin bed of coal is fed upon the made fire. The producer is now in shape for the next shift. When possible, dumping through the bell hopper should be done at regular intervals. The gas will be of greater uniformity, a condition important to the best metallurgical results.

The agitation of the fuel bed by hand poking does at least three things: It closes the channels, spreads the piles of freshly dumped coal under the bells out to the edges, and breaks up the sticking of material in the bed. The experienced producer man systematically pokes one hole on each side of the top at intervals. In the case of a six-hole top and 20-min. intervals, he will get over his bed once every hour. The most effective barring is done by beginning with a vertical motion of the poker, until the area commanded by the holes has been thoroughly broken well down to the ash. This straight up-and-down breaking is simply hand-churn drilling. The poker is then run down into the bed and given a sideways stirring movement; beginning near the surface, this should be continued well into the bed. At the surface, this movement spreads the coal, but farther down closes up the holes and makes the distribution of the blow more uniform over the cross-section of the producer. Here, too, is an opportunity for a mixing of ash with burning coal, with its troublesome results. The practical management of the producer is not a little in knowing how seldom to do this poking, for it can be overdone.

The ratio of air to steam can be roughly adjusted at the blower, but for anything like a uniform coal, it is best not to allow producer men very much latitude with these adjustments. A short time will teach a green man that he can lessen his hard muscular work by a

large quantity of steam. Steam, of course, is objectionable for metallurgical reasons and because of excessive steam consumption. Especially on very fine slack, the box blow under the grates must be cleaned often, and this is best made a routine affair. In cleaning or slicing the tops of the grate at monthly intervals, the following procedure is carried out: Shovel out ashes, cut chute through to ridge, the top hanging from clinkering, widen chute to ridge, slice grate face, do the same on other side of gable, thus finishing the producer. The shape of the slots in the grate is so arranged as not to bind easily.

Modified Duff With Chapman Agitator

The Chapman floating agitator has a horizontal rabble bar with projecting fingers that plow the fuel bed. This rabble extends nearly the diameter of a circular producer. It is attached to the end of a central shaft, which is revolved by a small motor, acting through an eccentric and ratchet to a worm gear. The speed of the central shaft is about 5 r.p.h. The central shaft has a spiral driving lug that permits a 24-in. (60.9 cm.) lift from the lowest position of the rabble. Twelve loose weights, of about 70 lb. (31 kg.) each, may be placed on top of the central shaft, if required, to hold down the rabble arm. All parts extending inside the producer are water-cooled. The cold water enters the top of the vertical shaft through a swing joint and is carried by an inside pipe to the fingers, where it is discharged and forced back up between the outer and inner walls. After cooling the rabble arm, the water is discharged from two overflow pipes on the central shaft into a sort of catch basin over the feed hopper. A spillway then drains the water into the hollow chamber surrounding the feed bell, where it also cools the tripod bearing. The final overflow is from the above chamber just below the floor level. The charging door, feed hopper, and feed bell are on the same principle as the old Duff and are operated by hand. The makers guarantee this machine to eliminate hand poking, and to seal off blowholes, giving a greater efficiency and capacity.

Installation at Roast Kilns at Depue

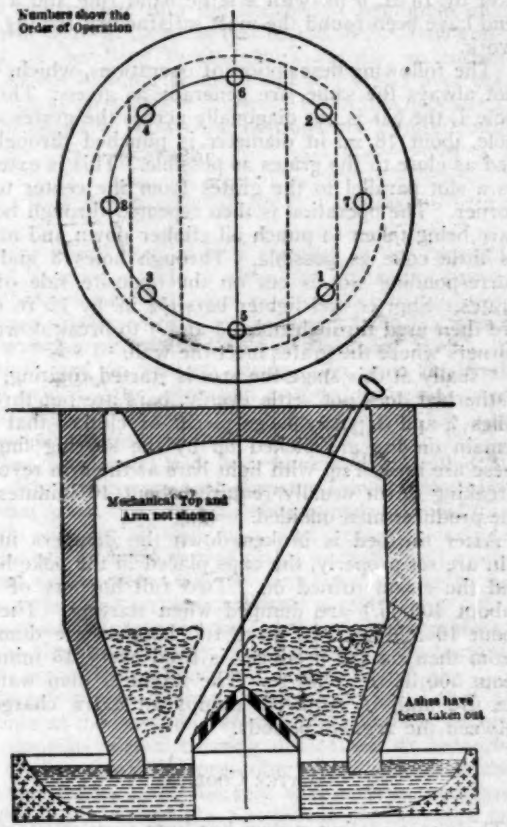
The producer originally was a 7 by 9 ft. (2.1 by 2.7 m.) rectangle inside a round steel shell 12 ft. 3 in. (3.7 m.) in diameter.

The old bricks were torn out and the shell lined with a firebrick wall about 12 in. thick. The grates are of the "A" type with 1 in. slots, and extend lengthwise of the original rectangle. Blank grates were added to increase the length to 10 ft. in. The grates were blanked off 16 in. on each end, leaving seven open grate castings on each side. The following is the present practice used in operating the mechanical-top producer:

Originally, there were two producer men on the first shift. With the softening of the clinker and the adoption of better methods, the labor of "breaking down" decreased, until it was possible to carry but one man on the first shift. There are three 8-hour shifts of one man each, 7 a. m. to 3 p. m., 3 p. m. to 11 p. m., and 11 p. m. to 7 a. m. There is, of course, more work for the man on the first shift, but as the shifts rotate every two weeks, it balances in the long run.

Removal of Ashes

The height of the rabble arm determines the amount of ashes to be removed. The removal of one wheelbarrow (about 380 lb., dry weight) of ashes will allow the rabble arm (if lifted) to settle a little more than 1 in.; that is, provided the ashes are taken out equally from both sides of the producer. The aim is to have the rabble arm lifted about 2 in. after it has leveled off the bed from "breaking down in the morning." For example, if the arm were lifted 10 in. (from the lowest position) at 7 a. m., three wheelbarrows of ashes would be removed from each side. After breaking down the fire and allowing the rabble arm about one hour to level of the bed, the arm would be lifted about two inches. Lately, it was found that, after removing ashes from both sides and not breaking down, the rabble arm settled itself. Accordingly, in order to lessen the work of breaking down in the morning, ashes are removed either during the afternoon or night or both, as the height of the arm warrants. In nearly every case the rabble arm has settled in from one to two hours. Ashes are always removed before breaking down the fire, and it is important that about the same amount be removed from each side.



Method of breaking down mechanical top producer.

Taking out ashes usually occupies about one-half hour in the morning. The ashes are loaded from the producer into two-wheeled carts holding (when fully loaded) about 550 lb. wet weight. The wheelbarrows

are dumped into the skip of an electric hoist, which the men operate as they use. The skip holds two wheelbarrows of ashes, and carries them from the producer cellar to the chute over a standard gauge railway car at ground level.

Breaking Down

Breaking down is done in the morning after taking out ashes. The steam is shut off and the dampers of the Swindell valve at the kiln are set to draw from the producer directly up the stack. Bars 1 in. in diameter by 13 ft. 6 in. with a large hand ring and a blunt end have been found the most satisfactory for the main work.

The following description of operations, which, while not always the same, are generally as given: Through hole 1, the bar is put diagonally across the grates and a hole about 18 in. in diameter is punched through the bed as close to the grates as possible. This is extended as a slot parallel to the grates from the center to the corner. The operation is then repeated through hole 2, care being taken to punch all clinker down and mix in as little coke as possible. Through holes 3 and 4 a corresponding slot is cut on the opposite side of the grates. Shorter and lighter bars, ¾ in. by 12 ft. 6 in., are then used through holes 5 and 6 to break down the corners where the grates meet the wall.

Usually at this stage the arm is started rotating, and, if the bed does not settle evenly, bars are put through holes 7 and 8. Any large pieces of clinker that may remain on top are picked up by the stirring fingers; these are broken up with light bars as the arm revolves. Breaking down usually requires about 40 minutes for one producer man unaided.

After the bed is broken down the dampers in the kiln are set properly, the cups placed in the poke holes, and the steam turned on. Two full hoppers of coal (about 400 lb.) are dumped when starting. Then in about 10 minutes two more full hoppers are dumped. From then on the producer is fired every 15 minutes, about 200 lb. to a charge. The producer man watches the fire and, if required, dumps an extra charge in between the regular periods.

Water Cooling

The water-cooling system has been very satisfactory. One of the stirring fingers was unscrewed after the producer had been in operation two months and it showed practically no deposit. The volume of water used is about 9 gallons per minute. The temperature of the water from the last overflow is usually 100 to 120 deg. Fahr., with the water entering the producer at 40 to 50 deg. Fahr.

The producer has not been in operation long enough to determine its wearing qualities. The only parts showing wear are the cast-iron dogs on the ratchet drive.

The gas from the producer enters a 27-in., inside diameter, brick-lined flue about 12 ft. long. It drops from this to an underground brick flue 2 ft. wide, 3½ ft. high, and 196 ft. long, to a 27-in., inside diameter, riser leading to the damper box. The first flue has an end door through which a scraper and air blast are used to push the soot and dust back into the producer. The underground flue has clean-cut openings, about 16 ft. apart, through which the deposit is removed with long iron-handled shovels. The air blast, which is a long ¾-in. iron pipe reduced to ⅜ in. connected to a ¾-in. hose, is used for a final clean-up in the underground flue.

All producer flues, corresponding to the first flue mentioned, are cleaned every two weeks. The accumulation from the mechanical producer in this flue is more than twice that from one Duff. This underground flue requires cleaning every two to four weeks, while the others run from three to six months. This condition is largely due to the low temperature at which the producer is operated; also to the length and cross-section of the underground flue. This one is about 33 ft. longer than the others and has the same cross-section.

Swindell Producer, Water Bottom

This producer consists of a water-seal bottom, thus differing from the Illinois Zinc Company, producer, and has built into its sides a bosh below which are set the inclined cast-iron grates. The blow is introduced at the bottom of the grate, which continues at the inclination of the narrowing sides. The feed hoppers are of the sliding box type. This producer is used at Mineral Point, Wis. At this plant they are gasifying 5 or 6 tons per day, which gives 10 lb. per sq. ft. of area per hour, or practically the same rates as at Depue. Screenings through 1¼-in. mesh are used as fuel, these coming from Granville and Cherry, Ill. In addition, southern Illinois run-of-mine coal is being used. The experience with washed "nut" showed unusually good results, but the cost made this material prohibitive.

The producers are cleaned down once in 24 hours, at which time the false bars are driven in through the ash bed, and the work is carried on much the same as at Peru. The average thickness of ash below the blow is at first 3 to 3½ ft. It is intended to leave 6 in. of ash over the top of the grates. This, of course, increases as the shift progresses. The fire bed itself varies from 2 to 4½ ft., and its poking is left to the judgment of the operator, rather than to regularly timed periods. The gas made runs about 5.4 per cent. CO_2 to 23.0 per cent CO after the producer has settled down to regular work. The blowing apparatus consists of a ½-in. pipe drawn to a ¾-in. opening and projected into a 6-in. cast-iron pipe, which in turn carries the blow into the internal pipe.

Dry-Bottom Mechanical Producer

The Hughes dry bottom was the first mechanical producer to be successfully adapted to the Western slacks, with the exception of an early type of the revolving producer, which was not a success on Illinois coals. This was a trial of two Taylor dry bottoms on one block of 800 retorts at the Illinois Zinc Company's plant about 1892.

At the Depue works, where the Hughes was first tried on this material in 1912, some time was required to develop operating methods, which permitted this producer to handle the varying grades of fuel. This type is now seen at both Depue and Granby. The operation becomes at once one in which maintenance is nearly as important as labor. Not that proper handling is less important; but the total man-hours per ton burned is much less and the upkeep of the apparatus greater. With this machine, six modifications have been made to meet the conditions and fuels at Depue.

1. The cast-steel spiders that support the central blow formerly caused some trouble from failure. This occurred only when handling the lower grade coals, which were high in ash. It was believed at first that proper cleaning down, i. e., not drawing down the ash bed so low, would stop this trouble. However, even with the most careful watching, conditions of great variation in the quantity of ash have developed and, occasionally, at such times the best of producer men would draw down hot clinker and coke and soften these castings. A sudden change in this ash content is very apt to change the thickness of the combustion zone and the depth of the ash above the hood. Usually, at such times the producer is "off feed" somewhat and the clinker may be hard to break down evenly. Then there is a tendency for some of the coke to "run," in other words, to rill down with ash where it does not belong. Any producer man is likely to pull his ashes either too little or too much; in the latter case the castings suffered.

In studying this, it was clear uniform, better grades of coal would probably cause little annoyance at this point. It was, however, the aim at Depue to tend more and more toward the less desirable coals and endeavor to build up a producer practice that could handle lower cost materials. For this reason, a steam-cooled box girder section was worked out by the Mineral Point organization and the Wellman-Seaver-Morgan Company. At the cleaning-out period, about 5 lb. pressure is kept on the blow, which insures a circulation of steam and air up through the central blow column, which in turn aids in cooling the spiders. In 3½ years we have had no trouble from these arms.

2. At the bottom of the brick lining is hung a cast-steel apron that extends to the ash tray and is supported upon the main frame by a projecting flange. In the case of warping, this apron ring, which is made in segments, has so distorted its upper circle as to allow the entire ring to drop upon the ash pan. Of course the hood must follow. In order to make this more sturdy, a change has been made in the fastening by adding steel clips and bolts at the top.

3. In mending poker ends, which have a life of from five to six months, the following method has been adopted: Castings of steel are made of varying lengths to take care of the different amounts worn off. The worn poker is machined to a square end and the casting held with a Thermit weld. Of course, these pokers wear more on the side that approaches the lining at the end of the stroke; at this point the abrasion is much greater from wall clinker.

4. The blow nipple, which is usually installed at 5/16 in., has been changed to ⅝ in.; the steam consumption can now be held low by operating at a lower line pressure, and at times of emergency there is less sluggishness in driving a producer up to a higher rate of gasification.

5. All overflows from the top carrying the cooling water are protected by vertical skimmers, much like those used on jig-screen discharges. This is to prevent the tar and soot accumulations from choking the pipes.

6. A flat-plate top modification was found necessary for the blower.

With coals that are high in tars, it is well to carry an extra poker, cross-head, and supporting trunnion so that when it becomes necessary to change pokers there need be little delay from sticking in taking the head to pieces.

The Wellman-Seaver-Morgan Company is now putting out a poker with a tip of high-carbon steel that is screwed into the end of the casting. It is the aim to twist the poker in the trunnion every three months, by which the life of an end may be lengthened. Of course, it may be rather serious when one of these pokers begins to leak during a shift. At such an emergency, if the water is cut off and the poker pulled at once, hand poking, if promptly and properly done, will carry the shift along until a new poker can be substituted. Sometimes, by cutting the flow to the poker to a minimum, so that the leakage into the fire bed is negligible, the poker will hold up until the end of the shift. It is convenient, in handling these repairs rapidly, to incorporate in the building frame a rail and crawl over the center line of the poker trunnions. From this depends a chain block, from which the castings are lowered into place.

Wet-Bottom Mechanical Producer

The two-speed shell gives a twisting to the fuel bed in the Chapman producer, while the stationary tuyere at the bottom functions also as a crusher of clinkers. These are subsequently raised by plows from the water scow with plows attached to the revolving shell. A magazine feed at the top serves also as a fuel-bed leveler, which latter operation is aided in some cases by a slicing loop hanging from the producer top into the fire bed. These producers are used at both Depue and East St. Louis, and four have been installed at Peru. The maintenance of these machines is the only important point not yet fully determined. Should the abrasion incident to keeping a fuel bed open include both the central hood or side plates instead of an easily replaced poker, there will be some question as to its fitness under long service on Western coals.

The chief difference in the handling of this producer and the Hughes is mainly in: Continuous discharging of ash, regulation of beds, and feeding.

Although the producer is stopped for some time at least once at the beginning of each shift, there is seldom much done in normal clearing out of ash or accumulated clinker from the preceding shift. In fact, the producer remains in a quiescent state and the beds are accordingly not disturbed. Should the routine work on the valves or flues require longer than usual, it is well to allow the producer man to put on a small amount of blow with air "full on" in order to maintain a proper bed temperature for efficient work when the furnace starts. The principal means for controlling the proper ratio of bed depths are: Rate of ash withdrawal by changing angle of the plows, rate of feed, and distribution of blow on tuyere.

Hand poking is seldom required with a proper location of the ash and fire beds in relation to the twisting zone. The first adjustment requires some patience to work out, but with watching can be handled within fairly close limits.

A change added by the Chapman Company is the Shelby steel water-tube drag, which is counter-weighted and hung into the top. It functions both as an agitator of the green-coal bed and a fuel leveler or distributor. With the tar and soot of a cool top, this is apt to give trouble from sticking at the higher level. With some slacks, the ash-bed resistance is so great from packing and clinkering that it is impossible to blow; in which case it is out of the question to carry the top of the fuel bed up to the magazine level. At such times, the

combustion zone is pulled well down over the hood and the feed does not function as a spreader or magazine.

For a period of forty-one days on one producer no real breaking down of the producer was required, and this on Illinois slack. The double feed hopper, which is a later development, is a real improvement over the original magazine arrangement.

The Wood producer embodies a stationary top, a revolving shell, an ash pan and water-seal bottom. Through the top of the producer are curved water-cooled pokers, which are raised and lowered through the bed. The ash is discharged in much the same way as on the Chapman. This producer has not the appearance of being very heavily armored against wear. It is said to gasify as high as 30 tons of coal per 24 hours. The Wood producers are in service in Meadowbrook, Burgettston, Terre Haute and Taylor Springs. From all reports they have shown a greatly increased efficiency in comparison with the Hegeler generators, which they have generally replaced, requiring 37 to 40 tons of coal per block per day as against 55 with the older type. Satisfactory operation is much easier than on the Hegelers and the maintenance moderate. The life of the poker is about six months.

Blowers

The three appliances used to furnish air for combustion in the producer are fans, steam jets and turbo-blowers. Of the steam blowers, the Schuette & Koerting of the general Eynon-Evans type is most often seen on Duff installations, while the Chapman and Hughes have their own proportioning of a series of concentric nozzles. Simple steam jets on cast-iron pipe are seen, but these are not of easy or complete regulation, as are the other types. At the best, any of the blowers are not very easy to regulate. With the great variation of the moisture content in the air pumped into a producer, there is no very effective way of keeping the proportioning of water and air correct. Blowers that can quickly meet the exigencies of the work and at the same time maintain the proper ratio are not simple to build. For example, this ratio will vary greatly with a high or low pressure under the beds. A close control can be had only when the blowing apparatus can force through a required quantity of air with a definite percentage of water, regulated in turn by some type of humidifier. This should be possible in spite of a change in bed resistance. Although fair results can be obtained with these crude devices, it is likely that they will be improved, both in respect to economy in horsepower used per cubic foot of air blown, as well as in control of air and water ratios.

At some German installations, a small quantity of producer gas is by-passed to be burned under a steam vaporizer; the vapor is then mixed with the desired quantity of air and blown into the producer. This system would appear at a slight disadvantage compared with using waste steam and a positive blower as proposed in this country. On steam-blown producers, the usual consumption of pounds of steam per pound of coal burned is about 0.4 to 0.6; at Depue 0.5 is a fair average. Certain blower manufacturers are now claiming, however, less steam than this.

A point not provided against by the manufacturer is the possibility of small pieces of clinker falling into the blower and plugging the nipple. The ordinary blower, after a few months of service, is not easily taken down for cleaning, as it is always rusted. A piping arrangement should be put in that can be quickly and easily removed and the nipple cleaned.

Quality of Gas

With the price of coal low, as it is at most plants, the question of quality of products at the gas plant is not always given the closest attention. There is, however, a growing tendency to keep more complete data on this point. There are certain aspects of the subsequent combustion in the furnaces and kilns that make the quality important, regardless of the question of a little more or less coal burned. With this in mind, some plants sample the gas regularly and even pay bonuses based on analyses. To those who have practised this over a period of several years, the results are seen to have easily justified the expense of such controls. These gains are incontrovertible, both as to ultimate fuel economy and metallurgical practice. In effect, they are valuable from two angles: First, a comprehensive knowledge to those in charge of the average working condition of the gas plants from month to month and, second, a help to those who are actually doing the work on the producer floor.

At Depue, samples are taken at two-hour intervals and reported to each individual battery and to the gas-house foreman, while the entire daily results are entered for record. A modified Hempel method is here used, with mechanical-shaking apparatus and such conveniences that one boy can handle all the work on a twelve-furnace plant. That each producer crew may shape up the work extra well just before sampling periods is natural, but, on the other hand, a fit producer will do passable work for at least 1½ hours more, so a fair average condition of machine and gas is maintained. In addition, a portable Smith calorimeter is used for continuous work; the principle and design of these instruments is well known. On bituminous-coal gas, additional filters are necessary to keep the machine from fouling on tars, dust, etc. Mineral-wool filters are used as roughers and large size filter paper for the final cleaning.

In testing the accuracy by analysis and computation, the most reliable values for the heats of combustion of the different constituents are assumed to be those used by the Bureau of Standards at Washington. These are the means of values found by a number of observers as given in Landolt-Bornstein-Meyerhofer's "Physikalisch-Chemische Tabellen" 3d edition (1905). They are said to be reliable to about 2 per cent. These have been corrected to give the so-called low values for those constituents containing hydrogen, as the bureau values assume that the water formed as a product of combustion is condensed to liquid, which is not the case either in the furnace where the gas is burned or in the calorimeter. These revised values were calculated by deducting the latent of heat of vaporization (at 62 deg. Fahr.) of the water formed by combustion. They are:

Gas	B.t.u. Per Cu. Ft. 62° F., 30 In. Mercury
H_2	275
CO	323
CH_4	910
C_2H_4	1497

Gas Cleaning

Very little has been done along the line of gas cleaning at any Western plant. Where generators are at the immediate ends of furnaces, with waste-heat boilers for recuperation at the other, there is little trouble from ash, dust, etc. On the other hand, where recuperators are of the checker-work type, with constricted ports delivering gas to the laboratory of the furnace, and, where long flue lines including reversing valves are included in the heating system, settling dust at convenient points in the system guarantees freedom from plugging at inaccessible bends and makes the clean-up less objectionable. At Depue, two general forms of apparatus have been tried, the first and less efficient is a simple vertical flue, into which the neck of the producer enters. The bottom half is used as a holder for settled dust, while the gas rises in the top part and is run over into the furnace flue. While this removed some of the fine dust, a good deal was carried along the flue and deposited. The diameter of this settler was the same as the flue, which was a mistake as it neither dropped the gas velocity materially nor gave sufficient impinging of gas on surfaces.

A more successful form is along the lines of a round settler or cyclone. It was not expected that, with the velocities as low as they are known to be, it would throw out much material from centrifugal impact. At the same time, a gently whirling action with the presentation of ample surface was depended on, together with several changes in direction of the flow. For example, a flue line from a mechanical producer that ordinarily required cleaning once a week, when equipped with one of these cleaners, was not cleaned for six months. Each day a few wheelbarrows full of ash dust were run out of the bottom into a narrow-gage car, which was all the flue cleaning necessary. The first cyclones were built with steel risers in the center, but these require replacing after a relatively short service. The center flues are now being built entirely of firebrick, with arches below.

RESULTS OF TEST MADE ON A HUGHES WORKING WITH ONE DUFF PRODUCER AS A SPELTER BLOCK UNIT

	Hughes		Duff	
	Total	Av. per Hr.	Total	Av. per Hr.
Hours firing producer	22.33	.....	22.42	.....
Coal as fired, pounds	26,460	1,185	16,390	731
Dry coal fired, pounds	22,090	989	13,686	610
Combustible fired, pounds	19,760	885	12,243	546
Total ash in coal, pounds	2,328	.....	1,442	.....
Carbon in ash, per cent	10	.....	10	.....
Ash removed, pounds	2,587	.....	1,603	.....
Carbon in ash, pounds	259	.....	160	.....
Fuel bed area, square feet	56.75	.....	62.5	.....
Coal as fired per square foot of fuel bed	466	20.9	262	11.70
Dry coal fired per square foot of fuel bed	390	17.5	219	9.77
Combustible fired per square foot of fuel bed	348	15.5	196	8.74
Average steam pressure, pounds per square inch	25.6	.....	15.0	.....
Weight of steam used, pounds	9,088	407	.....	.....
Coal fired equivalent to steam used	1,300	55.8	.....	.....
Dry coal fired equivalent to steam used	1,085	48.7	.....	.....
Combustible fired equivalent to steam used	970	43.4	.....	.....
Power used for driving machinery, horsepower	1.6	.....	.....	.....
Average pressure below fuel bed, inches, water column	1.6	.....	0.43	.....
Average temperature of gas, deg. Cent	405	.....	610	.....
Aver. pressure of gas above atmospheric, inches, water column	0.1	.....	0.1	.....
Barometric pressure, inches	29.6	.....	29.6	.....
Average temperature of outside air, deg. Fahr.	0	.....	0	.....
Average temperature cooling water, entering, deg. Fahr	55.9	.....	.....	.....
Average temperature cooling water, exit, deg. Fahr.	89.8	.....	.....	.....
B.t.u. in coal fired	285,240,000	12,774,000	176,680,000	7,880,600
B.t.u. in coal fired and steam equivalent	299,250,000	13,402,000	.....	.....
Cu. ft. of gas produced, 62 deg. Fahr., 30 in. mercury	1,182,700	52,965	759,980	33,897
Cu. ft. of gas per pound coal as fired, in producer	44.70	.....	46.37	.....
Cu. ft. of gas per pound dry coal fired in producer	53.54	.....	55.53	.....
Cu. ft. of gas per pound combustible fired in producer	59.85	.....	62.07	.....
Cu. ft. gas per pound coal as fired, inc. steam equivalent	42.62	.....	.....	.....
Cu. ft. gas per pound dry coal as fired, inc. steam equivalent	51.03	.....	.....	.....
Cu. ft. gas per square foot of fuel bed	20,840	933	12,160	542
Cu. ft. gas per pound combustible, inc. steam equivalent	57.05	.....	.....	.....
B.t.u. from gas	184,270,000	8,252,000	109,190,000	4,865,900
B.t.u. from gas per pound coal as fired in producer	6,964	.....	6,656	.....
B.t.u. from gas per pound dry coal as fired in producer	8,342	.....	7,971	.....
B.t.u. from gas per pound combustible as fired in producer	9,325	.....	8,910	.....
B.t.u. from gas per pound coal as fired, inc. steam equivalent	6,460	.....	.....	.....
B.t.u. from gas per pound dry coal as fired, inc. steam equivalent	7,738	.....	.....	.....
B.t.u. from gas per pound combustible as fired, inc. steam equiv.	8,650	.....	.....	.....
B.t.u. from gas per square foot fuel bed	3,242,000	145,410	1,745,500	77,854
B.t.u. from gas, per cent of B.t.u. in coal fired	64.60	.....	61.74	.....
B.t.u. from gas, per cent of B.t.u. in coal, inc. steam equivalent	61.58	.....	.....	.....

Efficiencies

The relative fuel efficiency of Western producers is difficult to determine. There are too many operations carried on with little or no testing, and perhaps are only required to give general results. A producer must give an abundance of gas, break down easily, and stand up to hard service. As to whether it utilizes the coal to the best possible advantage, that is, gives a minimum consumption, or that its product is the best suited for the work, few are in a position to say. Judging from the appearance of carbon in the ash, there are some serious losses at many plants.

Radiation losses are probably higher on hand-poked producers than on mechanically stirred. This results from blowholes. Of course with M. & H. producers, the loss by radiation from hot gas is much less than with the other types, and the sensible heat is utilized in heating. The recovery of the sensible heat in the gas is limited with recuperative heating systems, for as they arrive at the checkers at a higher temperature, so will the stack gases show a corresponding rise. One disadvantage of a hot top in heat recovery is the breaking up of the hydrocarbons, which should more properly be burned in the laboratory of the furnace. Testing on mechanical producers at Depue indicates a fuel efficiency of 65 per cent. This is upon the basis of British thermal units in coal charged to British thermal units in gas produced.

Average Gas Analysis

	Per Cent	Per Cent
CO_2	4.48	5.15
O_2	0.18	0.04
C_nH_m	0.4	0.4
CO	26.32	24.40
CH_4	3.86	3.83
H_2	10.60	8.49
B.t.u. per cu. ft., 62 deg. Fahr., 30 in. mercury	155.8	143.6

Analysis of Coal

	Cent Per	Cent Per
Moisture	16.5	16.5
Ash	8.8	8.8
Total carbon	51.2	51.2
Sulphur	3.1	3.1
B.t.u. per pound as fired	10,780	10,780
B.t.u. per pound dry coal	12,910	12,910
B.t.u. per pound combustible	14,430	14,430

It is certain, however, that the mechanical machines are the most efficient. An even production of gas and better control of both depths of producer beds and their temperatures is possible. Temperature charts of the producer beds have been made at Depue. On the Hughes, for instance, these beds show a curving of zones opposite in shape to those worked out on the Taylor at Norfolk by R. H. Fernald of the U. S. Geological Survey.

Developments

The Morgan producer shows evidence of great care in details of construction. If the representations made by the manufacturers are dependable, their operating performance on the first installation is excellent. How well the agitation of the bed can be maintained when badly clinkering coals are used is a point not as yet well proved. The manufacturer's statement that a "gas-making fire must not be disturbed" is at least open to question on some Western slacks. Water jacketing of the body has been first introduced in American practice.

Note should be made of the tendency of producer manufacturers abroad to build producers capable of handling very low-grade fuels carrying over 30 per cent ash. It was reported, by the Bureau of Mines who went over the situation in 1914-15, that, although these lower grade fuels could be worked, many plants preferred to pay a higher price for a fair grade of material. Undoubtedly we may look to those countries where good coals are becoming yearly more scarce, for substantial producer development on badly clinkering fuels. It will likely be some time before Western plants are obliged to consider any such high-ash coals. However, when some of the beds on the northern edge of the Illinois basin, for instance, are used, either preliminary washing or a change in producer practice will be necessary.

The two changes in producer construction that have done the most to allow these clinkering coals to be handled are: Water jackets in the walls around the hot zone and revolving eccentric grades.

In the first feature, lower fuel efficiencies may result from a high transfer of heat at the jacket surface. However, this may well off-set the disadvantage of a very wet blow, which would be required to make the clinker workable. Furthermore, high efficiencies are not probable on this class of material.

The second change, in respect to the agitation of the bed, is to bring the grinding action into play well toward the bottom of the producer. It should be more positive than the shearing zone of the Chapman and appears to serve a relatively greater depth of bed. The Rehmann, in fact, varies the depth of the grates to meet this change of thickness of the clinker. Developments along the lines of slagging producers seem to be only moderate. A few places in France and Germany have overcome, to some degree, the two drawbacks of high maintenance of linings and trouble from freezing, but only after much study.

Commission Rules Company Is Entitled to 7 Per Cent Return

The Illinois State Public Utilities Commission has issued an order giving the Consolidated Light & Power Company the right to raise the gas rates in the cities of Kewanee and Wethersfield, Ill., the following schedule:

Minimum monthly bill, $0.50, net $0.50.

First 1,000 cu. ft., $1.75 per 1,000, less 10 cents, net $1.65.

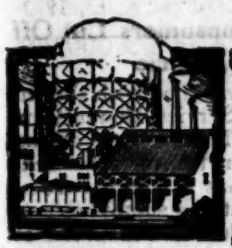
Next 4,000 cu. ft., $1.65 per 1,000, less 10 cents, net $1.55.

Next 10,000 cu. ft., $1.55 per 1,000, less 10 cents, net $1.45.

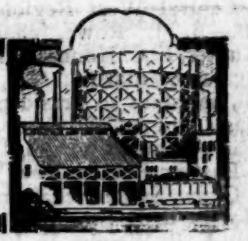
Next 15,000 cu. ft., $1.50 per 1,000, less 10 cents, net $1.40.

All over 30,000 cu. ft., $1.20 per 1000, less 10 cents, net $1.10.

The commission, in its orders above referred to, fixed the valuation of the gas plant at $345,000. The commission allows the gas company the annual sum of $6,037 for accruing depreciation which is calculated on 1.75 per cent of the fair value of the property and they order further that the company is entitled to 7 per cent of the above value as a fair rate of return.



NEWS OF THE GAS INDUSTRY



Worcester Gas Light Company Sold

The management of the Worcester (Mass.) Gas Light Company has passed into the hands of Chas. H. Tenny & Co., 201 Devonshire Street, Boston, which controls gas and electric light plants in the vicinity of Boston and throughout New England. President Willard B. Osborne, who has been president and general manager of the company for two years, has tendered his resignation and after a two months' vacation will enter the manufacturing business for himself.

According to the officials of the company, the only change contemplated in management is the addition of directors from the Tenny company. The present board of directors includes Francis H. Dewey as president of the board, Samuel B Woodward, George Crompton, Dewitt Clinton, Willard B. Osborne, Burton H. Wright, Charles G. Washburn, Paul B. Morgan and Louis H. Buckley.

Wider Study of Art of Window Display Urged

Otto S. Lasche, display manager of the St. Clair County Gas & Electric Company, in an address before the regular monthly meeting of the St. Louis Display Men's Club on Nov. 5 urged a wider study of design and art in window displays. He illustrated how parchment lamp shades may be used in the decorative scheme of show windows, and stereopticon slides were shown of the patriotic displays of the Peoples Gas Light Company of Chicago.

CENTRAL COUNTIES GAS COMPANY has applied to the California State Railroad Commission for authority to issue 28,500 shares of its common capital stock at 80 cents a share, the proceeds to be used for the construction of a new gasholder in Porterville.

Change of Instructions for Procedure in Coal Situation

Oscar H. Fogg Sends Out New Letter of Instructions

Supplementing the letter dated Nov. 3 published in last week's issure of the JOURNAL regarding procedure of public utility companies in the present coal situation, Oscar H. Fogg, secretary-manager of the American Gas Association, has sent out "Service Letter Number Two," which contains new instructions. Because of recent developments in the coal situation the United States Railroad Administration has been compelled to readjust conditions under which the National Committee on Gas and Electric Service will operate. Regional and district coal committees have been appointed, with a chairman for each regional and district coal committee and a public utility representative for each region and district. All requests for relief from public utilities in the coal situation should be directed to the public utility representative of the region or district, and not to the Committee on National Gas and Electric Service at Washington, as according to the first instructions. Mr. Fogg's Service Letter Number Two contains a list of all regions and districts, the name of the chairman of the coal committee and also the name of the public utility representative in each region and district. The letter follows:

SERVICE LETTER NUMBER TWO

Nov. 8, 1919.

To All Member and Non-Member Gas Companies:

Subject—Supply of Coal for Public Utilities.

Recent developments in the bituminous coal situation have necessitated a readjustment of the conditions under which the National Committee on Gas and Electric Service will operate in the present coal crisis.

There have been appointed by the United States Railroad Administration a number of regional and district coal committees, who have full authority to act on all matters relating to the distribution of coal for the electric railways, electric light and power companies, and gas companies.

The National Committee on Gas and Electric Service has appointed through the Central Coal Committee a public utility representative to keep in touch and serve with these regional and district coal committees, and to put at the disposal of these committees their entire information with reference to the requirements and necessities of the various gas and electric plants within each region. It will be the purpose of the public utility representatives to insure the prompt and impartial allocation of coal to utility plants with due regard to the supply on hand and the necessities which may exist in each case.

The regional and district coal committees so far appointed are as follows, and in each case the name of the public utility representative is given:

REGIONAL COAL COMMITTEES

Southwest Region, St. Louis—F. H. Greenlaw, chairman; C. A. Howe, Z. W. Brice, J. G. Livengood. Public utility representative: C. L. Holman, Laclede Gas Company, St. Louis, Mo.

Southern Region, Atlanta, Ga.—A. M. Smith, chairman; J. J. King, Horace Epes, F. H. Fechtig, S. L. Yerkes, G. W. Lamb. Public utility representative: Rawson Collier, Georgia Railway & Power Company, Atlanta, Ga.

Northwest Region, Chicago, Ill.—T. W. Proctor, chairman; Geo. W. Reed. Public utility representative: John P. Gilchrist, vice-president Commonwealth Edison Company, 72 West Adams Street, Chicago, Ill.

Central West Region, Chicago, Ill.—B. J. Rowe, chairman; P. Hunter, F. C. Honnold. Public utility representative: Geo. P. Mitchell, assistant to president, Peoples Gas Light & Coke Company, Michigan Avenue, Chicago, Ill.

Eastern Region, New York, N.Y. —G. N. Snider, chairman; A. K. Morris, R. D. Starbuck, A. E. Russell, F. B. Wright, H. L. Ingersoll, J. W. Searles. Public utility representatives: Northern New York north and west of Albany, J. T. Hutchings, Rochester Railway & Light Company, Rochester, N. Y.; New York south of Albany, Clifton W. Wilder, New York Edison Company.

Allegheny Region, Philadelphia, Pa.—J. B. Fisher, chairman; E. H. Bankard, W. S. Yeatte, J. W. Laurel, G. C. Foedisch. Public utility representative: J. A. Pearson, United Gas Improvement Company, Philadelphia, Pa.

Pocahontas Region, Roanoke, Va.—D. E. Spangler, chairman; E. J. Howe, fuel; E. T. Burnett, J. W. Coxe, T. D. Hobart. Public utility representative: J. W. Hancock, Roanoke Railway & Electric Company, Roanoke, Va.

DISTRICT COAL COMMITTEES

New England, Boston—P. R. Todd, chairman. Public utility representative: C. H. Hodskinson, Edison Electric Illuminating Company, 70 State Street, Boston, Mass.

Cincinnati—H. A. Worcester, chairman. Public utility representative: W. W. Freeman, president Union Gas & Electric Company, Cincinnati, Ohio.

Detroit—P. G. Findlay, G.F.A., M.C. Public utility representative: B. E. Morrow, Consumers Power Company, Jackson, Mich.

Kansas City—William Corbett, chairman. Public utility representative: P. J. Kealy, president Kansas City Railway Company, Kansas City, Mo.

Omaha—William Jeffers, chairman. Public utility representative: J. E. Davidson, vice-president Nebraska Power Company, Omaha, Neb.

Des Moines—C. W. Jones, chairman. Public utility representative: E. G. Schmidt, president Des Moines City Railway Company, Des Moines, Iowa.

Peoria—H. D. Page, chairman. Public utility representative: R. S. Wallace, vice-president Central Illinois Light Company, Peoria, Ill.

Additional regional or district committees will be appointed by the Central Coal Committee as the necessity arises, and in each case a public utility representative will be appointed to co-operate with the new committees formed.

Relief will be obtained through the regional coal committees or through the district coal committees, where such district committees have been appointed by the Railroad Administration. You are undoubtedly already familiar with the boundaries or limits of the regions in which your operations are carried on. They correspond to the present regions of the Railroad Administration, and in case of doubt inquiry of any railroad official will promptly disclose this information in detail.

All matters relating to the supply of coal for gas companies should be taken up direct with the public utility representatives of the National Committee on Gas and Electric Service in the respective regions and districts given in the foregoing. In applying for assistance to our representatives on the regional or district coal committees it is of the utmost importance that careful and accurate data be given of the number of days' supply of coal on hand, the daily consumption of coal, and general information of the services performed by the utility in question, in order that the utility representatives may handle the situation effectively.

Under the plan now in force requests are not to be forwarded to the Committee on National Gas and Electric Service at Washington. Such requests for assistance must go direct to the public utility representatives on the regional and district coal committees announced herein.

The National Committee on Gas and Electric Service is impartially representing the National Electric Light Association, the American Electric Railway Association and the American Gas Association, and its representatives on the regional and district coal committees should receive the complete co-operation of all electric light and power, street railway and gas companies operating in their region or district.

Yours very truly,

AMERICAN GAS ASSOCIATION,
OSCAR H. FOGG, Sec.-Man.

Industrial Consumers Cut Off in Muncie

A petition was filed with the Indiana Public Service Commission by the city of Muncie, Ind., asking the commission to order the Central Indiana Gas & Electric Company to discontinue supplying natural gas to industrial consumers at Muncie during the winter of 1919-1920. It is pointed out in the petition that the supply of natural gas is becoming less and should be conserved for domestic use.

The city says that the industries in Muncie consumed 44,000,000 cu. ft. of gas in November, 1918. Steps to conserve the natural gas supply by cutting off industrial consumers have been taken by the Ohio Public Utilities Commission, the petition says.

Plant Burned Down—Holders Not Damaged

Fire of unknown origin destroyed the plant of the Dallastown (Pa.) Gas Company. The structure, a two-story brick building, is entirely gutted out and the roof burned off. The fire was discovered by workmen who were installing a new boiler in the plant. Several men at work on the second floor were trapped and forced to jump from the windows. The loss is about $2,200, with no insurance. The tools of the workmen were lost in the flames. The plant furnishes light and fuel to Red Lion and Dallastown, Pa. The tanks are situated some distance from the building and were not damaged, so that there is a few days' supply of gas intact.

Natural Gas Mound Found on an Indian Reservation

A gas mound, said to be a duplicate of the one near Tahola in size and volume of natural gas issuing, has been found near the southeast boundary of the Quinault Indian reservation in the State of Washington. This mound is about twelve miles east of the one at Tahola.

WESTERN STATES GAS & ELECTRIC COMPANY.—Authorized by the Railroad Commission to withdraw from cash in the hands of trustees, $71,927.98, an amount equal to 75 per cent of the company's expenditures on capital account during July and August, 1919.

400,000 Cu. Ft. a Day Added Capacity

The Carolina Power & Light Company, of Raleigh, N. C., expects to have its new equipment at the gas plant in operation by Dec. 1 or soon thereafter. A new gas generator and a new holder are to be added to the plant.

These improvements would have been added by the company sooner, it is stated, but for the war, during which the Government forbade all construction not absolutely necessary.

The company announces its realization of the fact that the service has not been uniformly good, but feels that it cannot be held responsible for war restrictions or for unforeseen and unusual conditions which caused an unprecedented demand.

The new gas-making equipment will mean a capacity of 400,000 cu. ft. a day.

$1.40 Per 1,000 New Rate in Meriden

The Meriden (Conn.) Gaslight Company has announced a 15-cent increase, making the price of gas $1.40 per 1,000 cu. ft. net. The advance is attributed to "the recent rise in the price of labor, coal, oil, taxes and all other commodities entering into the manufacture of gas."

Lynchburg Company's Plant Consumption Doubled

J. C. Dickerson, of Richmond, Va., an engineer of the Virginia State Corporation Commission, stated before the council committee of Lynchburg, Va., on light, fire and electricity that the consumption of gas in Lynchburg, Va., has increased from 51,000,000 cu. ft. in 1915 to the rate of 100,000,000 cu. ft. a year at this time, and that this demand is so great on the plant that the Lynchburg Traction & Light Company cannot cope with it. The company is, however, installing a large plant.

THE J. G. WHITE COMPANY, INC., has announced the removal of its offices to 37 Wall Street, New York City. The company has recently enlarged its organization for the purpose of conducting a general business in the distribution of investment securities.

Larger Part of St. Louis Residence District Will Be Gas Lighted

The St. Louis Board of Estimate and Apportionment has decided to recommend that an item of $1,000,000 be placed in the proposed city bond issue for the purpose of establishing a lighting system for the parks and outlying districts and taking over the equipment of the Union Electric Company for arc lighting of the downtown streets.

The items of the proposed $1,000,000 issue are: Park lighting system, $200,000; outlying streets, $100,000; purchase of downtown equipment, $450,000; reserve for extending system, $250,000.

This will leave the larger part of the residence district gas-lighted, a condition which is not apt to be changed in the near future, inasmuch as city officials and the officials of the Laclede Gas Light Company have indicated their willingness to renew the contract which runs out in 1920.

If this bond issue fails to go through the city may be forced to sell $300,000 worth of its Liberty Bonds to provide sufficient funds to light the parks and so-called isolated streets, and the proposition of purchasing the downtown equipment may have to be dropped.

The members of the Board of Apportionment in deciding to include the $1,000,000 item in the bill explained that the condition of the general revenues would not permit an expenditure for lighting at this time, and agreed the cost could only be met by a bond issue or by selling some of the city's securities. The city owns $2,500,000 in Liberty Bonds of the various issues.

Improvements for Increased Capacity at Wallingford Company

The Wallingford (Conn.) Gas Light Company is soon to start improvements and construction work at its plant in Wallingford, which will result in a material increase in capacity, and an improvement in service.

The construction work will probably start early in December and it is expected that it will be completed about the middle of the month. Owing to war conditions the company was obliged to delay the construction project until the present time.

Henrico Gas Company to Be Sold for $175,000

Purchase of the Henrico Gas Company's plant by the city of Richmond, Va., will be effected probably this year, if the Richmond city council accepts the recommendation made by the finance committee. The citizens' committee voted unanimously for the proposition, recommending $175,000 as a fair and reasonable price. The Henrico company is willing to accept that amount. The price fixed is based upon the valuation report of Public Utilities Director Trafford, submitted last June.

It is expected that the first cost of the plant will be $185,000, as the city will be expected to make good $10,000 expended on additional piping and connections since the $175,000 offer was made. It will then be necessary to spend $100,000 and will require until next fall to make all the improvements needed.

California Company Gives Employees Insurance

The Southern California Gas Company announces a new policy in its affairs, namely: the issuance of an insurance policy for each of its employees. The beneficiary is named by the employee. It is a form of group insurance that is coming to be used by large companies, assisting in keeping their men more efficient and contented with their work.

Central Counties Company Will Increase Capital Stock

The Central Counties Gas Company, which sells gas in the cities of Visalia, Tulare, Exeter, Lindsay and Porterville, Cal., has applied to the California State Railroad Commission for authority to issue 28,500 shares of its common capital stock at 80 cents per share, the proceeds to be used for the construction of a new gas holder in the city of Porterville, Cal., and to refund a note of $7,000 held by the William R. Staats Company. The Staats Company has agreed to take the entire stock issued.

THE BOSTON CONSOLIDATED GAS COMPANY'S gas output for October was 548,061,000 cu. ft., an increase of 1 per cent compared with the corresponding month a year ago.

Time Saving Machine Digs Trench for Main Which Is Welded

The Public Service Company of Northern Illinois reports that construction work is proceeding on the new welded high pressure gas line which the company is laying between the Blue Island Gas Works and Harvey. The route is as direct as possible.

The trench for the main is dug by a bucket wheel trenching machine which not only saves a great deal of labor, but also speeds up the work. The bucket wheel on this machine can be raised or lowered as desired and the exact depth for digging the ditch is determined by staking the road by means of a level.

The ends of the pipe are beveled at 60 degrees to facilitate the welding, in which operation two lengths are placed on blocking, end to end and squared up with a straight edge placed on the sides. Two "button" welds are made 180 degrees apart so as to assure perfect rigidity of the two lengths during the remainder of the process. The latter may be described briefly.

A mixture of oxygen and acetylene is fed through suitable hose from tanks containing these gases under high pressures to the welding tool proper. Here the mixture burns with a flame similar to the Bunsen burner with a blast flame, only the heat generated is a great deal more intense. A portion of the end of the pipe next to the "button" is first heated to a melting heat, then a 3/16-in. rod of iron is brought in contact with the flame at this point, which melts it, and on cooling forms, with the adjacent portion of the pipe, one homogeneous piece. The flame is gradually brought up to bear on the section just above that treated and the iron bar melts and binds with the fusing edges of the pipe. This process is continued until the entire circumference of the end has been welded.

This work is carried out on the bank of the ditch, since it is easier to handle both the pipe and welding equipment to better advantage here than if the pipe was first placed in the ditch. Various lengths are welded one after the other until there is formed a continuous length of about 1,000 ft. The pipe is then lowered at one end and the remaining section quickly whips itself into the ditch. The strains caused in this process of lowering have an advantage that they automatically test the workmanship, and any defects in the weld will cause a rupture which can be more easily repaired at time of installation than if it developed after the line was put in operation.

The pipe is coated with a heavy pitch composition to protect the surface from rust, which is the greatest enemy to the life of a steel line. Valves are placed every half mile with a Dresser sleeve, which is similar to a slip or expansion joint on either side. The purpose of these sleeves is to permit the line to expand or contract without putting any strain on the valve itself.

Kentucky Company Will Issue Bonds for Improvements

Carl Mote, secretary of the Indiana Public Service Commission, issued a statement that the commission has authorized the United Gas & Electric Company, of New Albany and Jeffersonville, Ky., to issue $300,000 of 6 per cent gold notes.

It is provided in the order, however, that the notes must not be sold less than par and that the Middle West Utilities Company, the parent company, is to guarantee the payment of interest and principal.

Recently the public service commission denied a petition of the United Gas & Electric Company for authority to issue $300,000 of 6 per cent mortgage bonds, on the ground that the bonded indebtedness of the company already was almost equal to the value of its property. It is stated, however, that the evidence before the State public service commission showed that the demand for extensions and improvements of service in New Albany and Jeffersonville cannot be met, unless additional funds can be obtained.

Historical Society Visits Gas Works

The Rhode Island Historical Society includes in its winter program a series of visits to industrial establishments throughout the State of Rhode Island. The first of these visits of the society was made to the Blackstone Valley Gas & Electric Company in Pawtucket.

How coal and water gas is made and the by-products derived from these, coke, ammonia, tar and sulphur was demonstrated to the visitors.

Southern Counties Company Seeks to Extend Uses of Gas

The Southern Counties Gas Company has applied to the California State Railroad Commission to make effective a new industrial rate schedule in Ventura, Oxnard, Santa Paula, Fillmore and certain incorporated districts of Ventura County, Cal., and to establish a minimum flat rate of $1.35 per 1,000 cu. ft. It is the desire of the company to build up an industrial business in this district of California if an adequate supply of natural gas can be procured, and to accomplish this, it becomes necessary to inaugurate a new block rate schedule for industrial consumption.

The company believes that it will be able to develop other uses for natural gas, thereby making many present minimum consumers here larger users of gas. As the use of this fuel is increased, through the medium of the block system of rates, the rate paid per 1,000 cufl ft. decreases. But the minimum consumer's expenses are as heavy as those of the larger gas users. His expenses of metering, of billing and of collecting are just as great as though he were one of the biggest consumers. It is to cover these expenses of the small consumer that an increased minimum is asked by the company.

Only One Out of Five Compressors Wrecked in Explosion

News was given out by the Louisville (Ky.) Gas & Electric Company that, following an explosion at the compressor station of the United Fuel Gas Company at Kermit, Va., where there are five big compressors, after the debris had been removed it was found only one of the five compressors had been damaged so badly that it would have to be replaced. The others are damaged but can be repaired in a short time.

Officials of the company said that one or more of these compressors would be repaired in time to be in working order within a few days.

THE PUBLIC SERVICE COMPANY of Northern Illinois says that in its territory sales of water heaters of both the automatic and storage types are far ahead of sales for the same period last year.

President McCarter Effects Agreement with Seaboard Company

President McCarter, of the (N. J.) Public Service Gas Company, has made terms with the Seaboard By-Products Coke Company so that the threatened discontinuance of the gas supply furnished to the Public Service by the Seaboard will not take effect, as was announced several weeks ago. Mr. McCarter met officials of the Seaboard company in New York in order to reach an agreement whereby the Seaboard will continue to supply gas.

The Seaboard manufactures so much of the Public Service gas that Mr. McCarter has declared that North Jersey would be without gas at all if the concern cut off the supply. The gas manufactured by the Public Service is not enough to send through the mains. Some time ago the Seaboard notified the Public Service that more money must be forthcoming for gas if the Seaboard was to survive. A time limit was set by Seaboard officials in which the Public Service had to pay the increased rate.

An appeal by Mr. McCarter to the Board of Public Utility Commissioners for relief from part of the gas company's annual amortization fund so that the revenue usually accredited to that account could be spent for operating costs was recently rejected. Mr. McCarter had declared that the sum thus appropriated would pay the additional rate asked by the Seaboard.

When the Utility Board refused to consider the company's plea it handed down a decision in which it emphasized the obligation resting upon the Public Service Company to keep its patrons supplied with gas, irrespective of the financial condition of the by-products company. It announced at the same time its intention to exercise to the fullest extent the authority vested in it to compel the company to supply the service to which the public is entitled.

"If the company, relying upon its contract with the Seaboard has failed to maintain in a condition fit for efficient and economical operation any part of its plant," the decision declared, "the penalty must be paid by the company. The public cannot be expected to be penalized for failure of the company to so conduct its affairs as to have at all times ready for distribution to its patrons gas produced at as low a cost as is reasonably practicable."

Mr. McCarter refused to comment on the board's disposition of his plea for additional revenue raised collaterally in the company's application for a new gas rate, which is still pending.

Lynchburg Company Will Double Its Capacity

J. W. Hancock, general manager of the Lynchburg Traction & Light Company, of Lynchburg, Va., announced that the company has closed contracts for additional equipment which will double the manufacturing capacity of its gas works.

The plan to increase the production capacity of the gas plant has been under consideration by the company for some time, Mr. Hancock said, increased consumption making this action necessary. The general manager attributed the increased consumption not only to the growth of the city's population, but to the higher price of coal which, he said, had led many persons to substitute gas for coal in their kitchens.

Illinois Consolidated Company Making $85,000 Improvements

Extensive improvements costing $85,000 are in progress at the plant of the Consolidated Light & Power Company. This sum of money is being expended with the view of bettering gas and electric service in the cities of Kewanee and Wethersfield, Ill. Several of the larger improvements, such as the installation of the new engine, are practically completed. Some of the others are just being undertaken, but practically all of the work will be completed by Jan. 1.

Gas Machinery Company Installing Water Gas Sets in Galesburg and Champaign, Ill.

The Gas Machinery of Cleveland, Ohio, is installing 8-ft. water gas sets in Galesburg and Champaign, Ill., to take care of the growth in send-out at these two points. The contract also includes purifying apparatus, exhauster and other auxiliary equipment. The water gas sets will be operated by means of interlocking hydraulic valve boxes.

Central States Gas Company Granted Asked-for Relief

In order to provide sufficient revenue to meet reasonable operating expenses for the coming year, including taxes and depreciation, and to provide a reasonable return on the estimated value of the property, the Public Service Commission of Indiana has granted to the Central States Gas Company of Vincennes, Ind., an increase of its gas rates, effective from Oct. 1, 1919.

The new rates per month are as follows:

For the first 2,000 cu. ft. per month, gross rate, $1.50 per 1,000 cu. ft.; net rate, $1.40.

For the third 1,000 cu. ft. used, $1.35 per 1,000 gross, $1.25 per 1,000 net.

For the fourth 1,000 cu. ft. used, $1.20 per 1,000 gross, $1.10 per 1,000 net.

For the fifth 1,000 cu. ft. used, $1.10 per 1,000 gross, $1 per 1,000 net.

For all over 5,000 cu. ft. used, $1 per 1,000 gross, 90 cents per 1,000 net.

The net rate applies to all bills paid by the fifteenth day of the month succeeding the month of consumption. The gross rates apply to all bills not paid by the fifteenth of the month succeeding the month of consumption.

"The increase in rates secured by the Central States Gas Company is fair and above board, said Carl Spitzer of that company. "We placed our records on the table before the commissioners for inspection by their auditors. In addition, we gave the board all the estimates required of us. Their engineers made a survey of our holdings and of our business. The increase is what the board decided was due our concern.

"We went before the State commission on discovering that our assets were not meeting our liabilities. We laid all our cards before the board and asked for relief. The increase of rates is intended to make it possible for the company to realize 6 per cent interest on its investment. That is the limit allowed by law.

CONSOLIDATED GAS, ELECTRIC LIGHT & POWER COMPANY, of Baltimore, annual report for the fiscal year ended June 30, 1919, will not be issued, as the company has changed from fiscal to the calendar year. The next report to be issued will include operations for eighteen months to Dec. 31, 1919.

Commission Upholds Increases of Company Against Consumers Complaints

The twice-increased rates for gas consumption of the Philadelphia Suburban Gas & Electric Company, are not "unjust, unreasonable or excessive," the Pennsylvania Public Service Commission announces. Simultaneously the commission dismissed the complaints of the boroughs of Norwood, Prospect Park, Lansdowne, Pa., and others.

On Feb. 11, 1918, residents of Lansdowne, Pa., brought complaint against the service charges of the company for gas, effective Feb. 17, last year. The commission heard the cases, but prior to the completion of the presentation of evidence, notice of an additional increase was filed by the company. The complainants then filed a second complaint.

The company is operated by the American Gas Company, to which the Philadelphia Suburban Gas & Electric Company pays 3 per cent of its monthly gross receipts for executive, administrative and engineering services. Its work is divided into several divisions, and the complaints relate to the supply of gas in the Chester division, a separate operating unit.

The Public Service Commission says in its decision that the increases were justifiable in view of the increased cost of operation, notably of coal, oil and labor. Answering the complainants' charge of discrimination, the commission says:

"The practice of public service companies selling large quantities of gas, water and electricity at what might be termed 'wholesale' rates, whereby the unit of cost to the consumer is lessened, has long been recognized by both commissions and courts as being beneficial alike to the companies and all their consumers and does not constitute unjust discrimination."

Saranac Company Asks Permission to Float $95,000 Mortgage

John Crowley, of Saranac Lake, N. Y., and Patrick A. Hallahan, of Brasher Falls, N. Y., operating the Saranac Gas Company, have applied to the New York Public Service Commission, Second District, for authority to transfer the gas company and franchise under which it operates as the Mountain Gas Company, Inc., which was incorporated June 23, 1919, to manufacture and supply gas in the towns of St. Armand, North Elba and Harrietstown, N. Y., with an authorized capital of $50,000. The village board has consented to the transfer and to a charge of $2.20 per 1,000 cu. ft. for gas in the village during 1919, 1920 and 1921.

The company asks authority to float a mortgage of $95,000 and to issue under the mortgage $25,000 in bonds, $25,000 in preferred stock and $45,000 in common stock. It is to pay $25,000 in cash, $20,000 in preferred stock and a certain amount of common stock for the gas property.

Two valuations of the company's property accompanied the petition, the valuations being $94,837 and $110,853. The real estate is valued at $22,300.

Governor Allen Orders Investigation of Kansas Production

Governor Allen, of the State of Kansas, has ordered an investigation of the actual and potential gas production of the Kansas fields and prices paid by pipeline companies to gas producers and the cost of production. This will be an investigation of the assertion of oil and gas producers that there is an unlimited supply of gas in Kansas.

Dyeing and Cleaning Industry Finds Gas the Superior Fuel

In the dyeing and cleaning industry, gas is demonstrating its superiority over other fuels in necessary heating processes. The Public Service Company of Northern Illinois says that in various establishments throughout its territory, gas steam boilers are being employed in the pressing operations, and also hot air generators for deodorizing and drying. The latter devices are particularly important and satisfactory. They enable the dyer to become independent of weather conditions and to make great savings in time. Using them, less than an hour is necessary to deodorize and dry fabrics as compared with a period several times longer with other older methods. By means of gas in a boiler devised for the purpose, the spirits used in cleansing are largely recovered. The operation is performed by distillation and the fluids are freed from all dirt.

Natural Shut Off from Big Industrial Consumers; Requested to Use Other Fuel

The Interstate Public Service Company, operating in New Castle, Ind., has taken the initiative in dealing with the gas problem in its territory the coming winter and discontinued gas for industrial purposes on Nov. 10. Natural gas from the West Virginia field is sold in New Castle through the Interstate company and Walter Jones, local manager of the company, announced that letters had been sent to five factories using gas for industrial purposes, announcing that in order to give gas during the winter months to domestic consumers, it would be turned off to the factories on Nov. 10. On Oct. 13 the Interstate company sent letters to the Indiana Rolling Mill Company, the Indiana Shovel Company, the Pan-American Bridge Company, the National Spring Company and the Maxwell Motor Company telling them it will be necessary to discontinue the industrial service this winter and asking the companies to provide some other fuel.

P. S. C. Will Enforce Order Restricting Use of Gas

The New York Public Service Commission has notified about 3,000 users of natural gas in Buffalo, Salamanca, Lackawanna and other places in western New York, that it will enforce its order forbidding use of natural gas for three months from Dec. 15, in furnaces originally constructed for the consumption of coal.

The notice was sent to natural gas consumers who have asked exemption from the provisions of the order and to persons who have corresponded with the commission on the use of natural gas for fuel. The commission urges those having coal furnaces to prepare to use coal during the restricted periods in order to conserve the supply of gas for cooking and lighting purposes.

A Massachusetts Municipal Plant Has to Raise Its Rate

Increased rates of ten cents per 1,000 for gas which is sold by the Municipal Light Plant, in Wakefield, Mass., it was announced would be put in effect, making the new price $1.70 per 1,000 cu. ft., with a discount of 10 cents per 1,000 cu. ft. for prompt payment of bills.